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Physical and Chemical Properties of Three Groups of Mississippi River Alluvial Soils In the Sugarcane Area of Louisiana

Ray Ricaud, L. E. Golden and S. A. Lytle[1]

INTRODUCTION

The soils of the Mississippi River Alluvium of the Yazoo area were originally classified as the Yazoo, Sharkey and Muck series (*4*).[2] The Yazoo and Muck series were discarded and Commerce and Mhoon were established as soil series with the result that the Commerce, Mhoon and Sharkey are three of the Recent Alluvial soils in the Mississippi River floodplain (*12, 21*).

The initial intent in this study was to include only soils classified as Commerce, Mhoon and Sharkey during the sampling period from 1965 to 1969. However, recent refinements in soil classification indicate that additional associated soils were included (*22*). Therefore, for the purpose of this publication, the soils were referred to as Commerce group soils, Mhoon group soils and Sharkey group soils. These groupings facilitate the presentation of the results and are consistent with the manner in which the soils were grouped at the time of sampling. They do not reflect a strict grouping by soil series, since each of the three groups may contain soils from series other than the one used in naming the groups.

The Recent Alluvial soils in the sugarcane area were deposited by floodwaters of the Mississippi River and Bayou Lafourche from the time the Mississippi began to flow in its present channel approximately 3,000 years ago (*5*) until the construction of flood control systems during the early part of this century. The coarser-textured Commerce group soils are moderately well drained and occur on natural levees near the overflowing streams. The Mhoon group soils are nearly level and not as well drained as the Commerce. The finer-textured Sharkey group soils are poorly drained and occur in and near the "back-swamps" farthest from the streams.

Previous work (*6, 7, 16, 19*) showed that wide variations occurred in the extractable nutrient content and in the response of sugarcane to applied fertilizers in Recent Alluvial soils. Reed and Sturgis (*15*) re-

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[2]Italic numbers in parentheses refer to Literature Cited, Page 55.

ported that soils with a high clay content generally had a higher nutrient content in the subsoil than in the topsoil and that deep-rooted plants assimilated large amounts of nutrients from the subsoil.

Ricaud (*16*) obtained a significant relationship between extractable potassium and the increase in yield of sugarcane from applied fertilizer potassium. Golden (*6*) found that the increase in yield of sugarcane from applied fertilizer phosphorus was greater on fine-textured than on coarse-textured soils, apparently due to the restricted aeration and root penetration in fine-textured soils. Abdol (*1*) reported that during a 13-year period beginning in 1960 the steady depletion rates of soil nutrients in Mhoon soils were substantially greater than the amounts removed by sugarcane.

Sturgis and McMichael (*20*) found that soils with a low clay content exhibited more profile development than did soils with a high clay content. Shuker (*17*) reported that more horizon development occurred in the Mississippi River Terrace soils than in the Recent Alluvial soils.

Jeffries (*11*) concluded that soils of similar origin can be determined on the basis of their mineralogical properties. Holmes and Hearn (*8*) concluded that the Recent Alluvial soils were derived primarily from the eastern slopes of the Rocky Mountains and the Great Plains.

The primary objective of this study was to determine the variations in the physical and chemical properties that occur within and among the Commerce, Mhoon and Sharkey groups of soils in the sugarcane area of Louisiana. The results should contribute to the soil fertility maintenance programs and management of these soils.

MATERIALS AND METHODS

The Commerce, Mhoon and Sharkey groups of soils were sampled at 28, 30 and 24 locations, respectively, during the period from 1965 to 1969. The locations, shown in Table 1, were selected to represent the sugarcane producing parishes in the Lower Mississippi River floodplain in Louisiana. The area sampled extends from West Feliciana Parish, along the Mississippi River to St. Charles Parish and along Bayou Lafourche from its origin in Ascension Parish to Terrebonne Parish. Soil profile samples were collected from the Ap, A-C and C horizons of each soil during the fallow year in a sugarcane production cycle. The horizon designation and soil structure, consistency and color of each sample were determined in accordance with standard procedures (*18*). Percentages of sand, silt and clay in the soil were determined by the hydrometer method (*13*).

The extractable potassium, calcium, magnesium and sodium were extracted with a 0.1 *N* hydrochloric acid solution at a soil-to-solution ratio of 1:20. The exchangeable bases were extracted by the ammonium acetate method (*14*). The total bases were extracted by using the hydrofluoric acid method described by Jackson (*10*). The concentrations of the extractable, exchangeable and total bases were determined with a

Beckman Model DU flame spectrophotometer (*9*). Exchangeable hydrogen was determined by the barium acetate titration method (*10*).

Sulphur was extracted with a solution of 0.5 *N* ammonium acetate and 0.25 *N* acetic acid and determined according to the modified turbidity method of Bardsley and Lancaster (*2*). Total soil nitrogen was determined by the Kjeldahl method (*10*). Organic carbon was obtained by the Walkley-Black wet combustion method (*23*).

The cation exchange capacity of the soil was obtained by summation of the exchangeable potassium, sodium, calcium, magnesium and hydrogen. Percent base saturation was calculated by dividing the total exchangeable bases by the cation exchange capacity and multiplying by 100. Soil reaction (pH) was measured in a soil-to-water ratio of 1:1 using a Beckman Zeromatic pH meter.

Table 1.-Locations selected for sampling three groups of Mississippi River alluvial soils in the sugarcane area of Louisiana.[1/]

Location number	Commerce group soils		Mhoon group soils		Sharkey group soils	
	Plantation	Parish	Plantation	Parish	Plantation	Parish
1	Angola	W. Feliciana	Angola	W. Feliciana	Catherine	W. B. R.
2	Bonaventure	P. Coupee	Angola	W. Feliciana	P. Grove	W. B. R.
3	Alma	P. Coupee	Sugarland	P. Coupee	Cinclare	W. B. R.
4	Smithfield	W. B. R.	Alma	P. Coupee	M. Grove	Iberville
5	Smithfield	W. B. R.	Smithfield	W. B. R.	Evergreen	Iberville
6	Barrowza	W. B. R.	Westover	W. B. R.	C. Grove	Iberville
7	Barrowza	W. B. R.	P. Grove	W. B. R.	E. Hall	Ascension
8	Cinclare	W. B. R.	Cinclare	W. B. R.	Palo Alto	Ascension
9	Cinclare	W. B. R.	St. Louis	Iberville	Graugnard	St. James
10	Ben Hur	E. B. R.	C. Grove	Iberville	Helvetia	St. James
11	M. Grove	Iberville	L. Landry	Iberville	Armant	St. James
12	L. Ridge	Iberville	E. Hall	Ascension	Frisco	St. John
13	L. Ridge	Iberville	Sunshine	Ascension	Lula	Assumption
14	Alahambre	Iberville	Palo Alto	Ascension	Westfield	Assumption
15	McManor	Ascension	St. Mary	St. James	Glenwood	Assumption
16	E. Hall	Ascension	Gravois	St. James	C. Grove	Assumption
17	Stein	St. James	Graugnard	St. James	Leighton	Lafourche
18	Graugnard	St. James	Frisco	St. John	Mary	Lafourche
19	Armant	St. James	Chilton	St. John	Georgia	Lafourche
20	Columbia	St. John	Lula	Assumption	Valentine	Lafourche
21	Whitney	St. John	Glenwood	Assumption	Cynthia	Terrebonne
22	Goldmine	St. John	Harang	Assumption	Southdown	Terrebonne
23	Reserve	St. Charles	Caldwell	Lafourche	Ashland	Terrebonne
24	Waterford	St. Charles	Raceland	Lafourche	M. Grove	Terrebonne
25	Avon	Assumption	Georgia	Lafourche		
26	L. Texas	Assumption	Georgia	Lafourche		
27	Georgia	Lafourche	Caldwell	Terrebonne		
28	Argyle	Terrebonne	Southdown	Terrebonne		
29			R. Cox	Terrebonne		
30			Montegut	Terrebonne		

[1/] The Commerce, Mhoon and Sharkey were sampled at 28, 30 and 24 locations, respectively.

DISCUSSION OF RESULTS

Variations in the chemical properties among locations in the Ap, A-C and C horizons of the Commerce, Mhoon and Sharkey groups of soils are summarized in Tables 2, 3, 4 and 5. The variations are expressed as ranges and means among locations for each horizon of each soil group. The detailed data obtained for each location are presented in the Appendix, Tables 6-10 for the Commerce, Tables 11-15 for the Mhoon and Tables 16-20 for the Sharkey group of soils.

Soil Physical Properties

The data obtained on the physical properties of the Commerce, Mhoon and Sharkey groups of soils are reported in the Appendix, Tables 6, 11 and 16, respectively.

The variations among locations in the textural class, structure, consistency and color of the soils within each group were relatively small. Soils in the Commerce group were predominantly granular, friable, dark grayish brown loams and silt loams in the Ap, A-C and C horizons. Soils in the Mhoon group were mostly granular, friable, dark grayish brown silt loams and silty clay loams in the Ap horizons and blocky to weak blocky, plastic, gray silty clay loams in the A-C and C horizons. Soils in the Sharkey group were predominantly blocky, plastic, dark gray clays in each horizon.

Soil Chemical Properties

Potassium and Sodium

The potassium and sodium data reported in Table 2 are summarized from the Appendix, Tables 7, 12 and 17. Wide ranges were obtained among locations in the extractable and exchangeable potassium and sodium contents in each horizon of the three soil groups. Extractable potassium in the Ap horizon ranged from 82 to 239 ppm in the Commerce, from 90 to 420 ppm in the Mhoon and from 172 to 367 ppm in the Sharkey group. Similar ranges occurred in the A-C and C horizons and in the exchangeable potassium in each horizon. The mean differences among horizons in each group were small. The mean values in each horizon were lowest in the Commerce and highest in the Sharkey group, due mainly to the clay content. Relatively narrow ranges were obtained in the total potassium among locations, horizons and soil groups. The extractable potassium was a very small percentage of the total potassium in all the soils. The sodium values were lower, but varied similarly to potassium, except that the extractable and exchangeable sodium increased consistently with depth.

Table 2.-Potassium and sodium contents among locations in each horizon of three groups of Mississippi River alluvial soils.

Soil horizon	Commerce group		Mhoon group		Sharkey group	
	Range	Mean	Range	Mean	Range	Mean
			Extractable K, ppm			
Ap	82-239	130	90-420	204	172-367	246
A-C	72-191	112	124-322	214	158-284	234
C	70-193	117	140-316	219	192-288	238
			Exchangeable K, ppm			
Ap	89-226	140	127-588	255	216-528	355
A-C	67-212	105	143-395	267	173-488	356
C	55-157	107	144-442	280	223-471	358
			Total K, percent			
Ap	1.65-2.04	1.90	1.66-2.14	1.84	1.44-2.04	1.74
A-C	1.80-2.18	1.97	1.68-2.37	1.90	1.46-1.99	1.74
C	1.72-2.16	1.97	1.66-2.27	2.20	1.40-2.05	1.79
			Extractable Na, ppm			
Ap	10-221	54	50-246	79	66-161	103
A-C	15-139	81	62-176	104	72-225	143
C	21-179	85	72-186	115	124-281	163
			Exchangeable Na, ppm			
Ap	12-179	44	22-249	62	39-224	80
A-C	14-115	63	32-218	81	51-188	96
C	15-159	67	34-272	92	71-200	113
			Total Na, percent			
Ap	1.08-1.45	1.28	1.16-1.82	1.35	0.98-1.47	1.13
A-C	0.98-1.46	1.23	1.08-1.76	1.31	0.93-1.36	1.15
C	1.06-1.73	1.24	0.96-1.54	1.26	0.95-1.36	1.19

Calcium and Magnesium

The calcium and magnesium data reported in Table 3 are summarized from the Appendix, Tables 8, 13 and 18. Wide ranges were found among locations in the extractable and exchangeable calcium and magnesium contents in each horizon of the three soil groups. Extractable calcium in the Ap horizon ranged from 1,115 to 7,123 ppm in the Commerce, from 1,738 to 3,784 ppm in the Mhoon and from 3,768 to 6,495 ppm in the Sharkey group. Similar variations occurred in the other horizons. The extractable was higher than the exchangeable calcium only in the Commerce, indicating the presence of relatively more acid soluble calcium in the coarser-textured soils. The mean values

Table 3.-Calcium and magnesium contents among locations in each horizon of three groups of Mississippi River alluvial soils.

Soil horizon	Commerce group		Mhoon group		Sharkey group	
	Range	Mean	Range	Mean	Range	Mean
			Extractable Ca, ppm			
Ap	1115-7123	2475	1738-3784	2606	3768-6495	4900
A-C	1527-13350	4467	2444-6431	3465	3749-6480	5092
C	1942-14750	5256	2349-5523	3730	3635-6653	5113
			Exchangeable Ca, ppm			
Ap	1038-3531	1947	2200-3798	3056	1301-7508	5707
A-C	1308-4188	2931	2642-5535	3951	5010-8071	6200
C	1031-4615	2985	27-7-5829	4153	4851-9401	6254
			Total Ca, percent			
Ap	0.64-1.42	0.97	0.54-1.09	0.72	0.61-1.38	0.99
A-C	0.70-1.73	1.02	0.54-1.47	0.80	0.67-1.49	1.11
C	0.67-1.72	1.10	0.51-1.41	0.83	0.80-1.84	1.23
			Extractable Mg, ppm			
Ap	183-1587	409	413-1134	636	797-1313	1079
A-C	267-2209	773	653-1898	978	970-1598	1250
C	268-2495	1025	644-1468	1085	933-1899	1343
			Exchangeable Mg, ppm			
Ap	259-777	407	356-1169	638	896-1598	1193
A-C	380-964	630	447-1360	862	960-1663	1337
C	315-865	644	319-1252	910	845-1724	1340
			Total Mg, percent			
Ap	0.39-0.87	0.63	0.39-0.69	0.54	0.61-1.03	0.81
A-C	0.44-1.02	0.81	0.51-1.05	0.76	0.80-1.10	0.92
C	0.47-1.11	0.81	0.51-1.05	0.76	0.80-1.10	0.92

for each horizon increased with depth in the soil, particularly in the Commerce. The values were lowest in the Commerce and highest in the Sharkey group. Relatively small variations occurred in the total calcium among the locations, horizons and soil groups. The magnesium content was lower, but varied similarly to the calcium values.

Phosphorus, Sulphur, Carbon and Nitrogen

The phosphorus, sulphur, organic carbon and nitrogen data reported in Table 4 are summarized from the Appendix, Tables 9, 14 and 19. Wide ranges occurred among locations in extractable and total phosphorus content in each horizon of the three soil groups. Extractable

phosphorus in the Ap horizon ranged from 135 to 627 ppm in the Commerce, from 143 to 521 ppm in the Mhoon and from 124 to 992 ppm in the Sharkey group. The mean differences were relatively small among horizons in each soil group and among soil groups in each horizon. Almost one-half of the total phosphorus was in the extractable fraction. Only a small portion of the phosphorus extracted by the method used is actually available for uptake by plants. Extractable sulphur determined by the method described by Bardsley and Lancaster (*2*) was very low, and the differences among locations, horizons and soil groups were small.

The data in Table 4 also show the variations in organic carbon and total nitrogen that occurred among locations, horizons and soil groups.

Table 4.-Phosphorus, sulphur, carbon and nitrogen contents among locations in each horizon of three groups of Mississippi River alluvial soils.

Soil horizon	Commerce group		Mhoon group		Sharkey group	
	Range	Mean	Range	Mean	Range	Mean
			Extractable P, ppm			
Ap	135-627	299	143-521	269	124-992	264
A-C	136-1100	295	143-402	245	95-600	217
C	211-1320	323	140-372	264	106-313	216
			Total P, ppm			
Ap	350-883	528	344-999	558	483-1529	807
A-C	409-1287	589	415-867	523	373-939	607
C	366-1383	600	249-690	520	398-956	593
			Extractable S, ppm			
Ap	4-18	7	4-16	9	6-28	12
A-C	2-11	6	4-18	6	4-18	9
C	1-18	6	2-16	6	4-12	7
			Organic C, percent			
Ap	0.29-1.09	0.64	0.43-1.61	1.05	1.54-2.73	2.01
A-C	0.28-0.83	0.46	0.27-1.19	0.65	0.74-2.36	1.18
C	0.19-0.81	0.38	0.25-0.91	0.49	0.44-1.94	0.92
			Total N, percent			
Ap	0.03-.10	0.06	0.05-.20	0.11	0.11-.19	0.15
A-C	0.03-.08	0.05	0.03-.12	0.07	0.07-.16	0.11
C	0.02-.08	0.04	0.04-.10	0.06	0.07-.16	0.09
			C/N Ratio			
Ap	7.9-12.3	10.0	8.6-12.0	9.8	11.4-14.9	13.4
A-C	6.9-13.4	9.5	6.9-10.9	8.7	8.9-16.3	11.5
C	5.0-13.9	9.8	5.0-10.4	8.0	7.8-14.2	10.5

Organic matter, obtained by multiplying organic carbon by 1.724, ranged in the Ap horizon from 0.50 to 1.88 percent in the Commerce, from 0.74 to 2.78 percent in the Mhoon and from 2.65 to 4.71 percent in the Sharkey group. Organic matter and total nitrogen were lowest in the Commerce and highest in the Sharkey, and decreased with depth in the soil in each of the groups. The carbon-nitrogen ratio varied considerably among locations in each horizon of the three soil groups. The mean ratio in the Ap horizon was 10.0, 9.8, 13.4 in the Commerce, Mhoon and Sharkey groups, respectively.

Clay, Exchange Properties and Soil Reaction (pH)

The clay content, exchange properties and pH values summarized in Table 5 are shown in detail in the Appendix, Tables 10, 15 and 20.

Table 5.-Clay content, exchange properties and soil reaction among locations in each horizon of three groups of Mississippi River alluvial soils.

Soil horizon	Commerce group		Mhoon group		Sharkey group	
	Range	Mean	Range	Mean	Range	Mean
			Clay, percent			
Ap	8.9-25.5	14.4	11.5-56.6	26.0	33.4-73.5	57.4
A-C	12.8-31.5	21.7	14.2-66.7	35.6	34.9-78.0	63.7
C	8.8-30.0	20.5	15.5-57.9	37.8	50.0-79.9	63.5
			Cation Exchange Capacity, m.e./100g			
Ap	9.4-23.0	14.6	16.0-37.1	23.5	32.3-50.9	42.4
A-C	10.5-28.6	21.0	17.4-41.6	28.9	33.4-50.7	43.5
C	9.0-29.9	21.2	19.8-41.1	30.0	33.9-59.5	43.3
			Exchangeable H, m.e./100g			
Ap	.0-3.1	1.0	.0-4.4	2.0	1.1-4.5	3.0
A-C	.0-3.0	.7	.0-2.3	.9	.0-2.8	1.2
C	.0-2.2	.4	.0-1.7	.5	.0-2.6	.7
			Exchangeable Bases, m.e./100g			
Ap	7.7-22.8	13.6	15.3-35.1	21.5	30.4-47.9	39.4
A-C	10.5-28.6	20.4	17.4-40.4	28.0	32.0-50.7	42.3
C	9.0-29.9	20.8	18.7-40.5	29.5	32.4-59.5	42.6
			Base Saturation, percent			
Ap	80.4-100	93.2	80.6-100	91.6	88.4-97.2	93.0
A-C	85.0-100	97.1	91.2-100	96.6	94.7-100	97.1
C	88.7-100	98.1	91.6-100	98.0	93.9-100	98.2
			Soil Reaction (pH)			
Ap	5.1-8.2	-	5.3-7.6	-	5.9-7.3	-
A-C	6.1-8.2	-	6.2-7.7	-	6.3-7.6	-
C	6.2-8.3	-	6.5-7.7	-	6.5-7.7	-

Wide ranges were found in the clay content of the soils among locations in each horizon of the three soil groups and among the soil groups. Similar variations were found in the cation exchange capacity and exchangeable bases associated with the clay content. The percent base saturation and pH values varied substantially among locations and increased with depth in the profiles.

SUMMARY AND CONCLUSIONS

A study was made of the physical and chemical properties of the Commerce, Mhoon and Sharkey groups of soils in the sugarcane area of Louisiana. Soil profile samples were collected from the Ap, A-C and C horizons of each soil group at several locations. The samples were analyzed to determine the variations in the soil properties among horizons, locations and soil groups.

Relatively small variations were found in the soil textural class, structure, consistency and color among locations in each soil group. Wide ranges occurred in these physical properties among the soil groups in each horizon and among horizons in the Mhoon. The ranges among horizons in the Commerce and Sharkey groups were small.

Wide variations were obtained in the extractable and exchangeable bases, extractable and total phosphorus, carbon-nitrogen ratio, soil reaction (pH) and exchange properties of the soil in each horizon of each soil group at different locations. Moderate ranges in organic matter and total nitrogen content and narrow ranges in the total bases and extractable sulphur were found among locations in each soil group.

The extractable calcium and magnesium, soil reaction (pH) and exchange properties increased substantially with increasing depth of the horizons in each group; the organic matter and total nitrogen decreased. The extractable bases, clay content and exchange capacity were lowest in the Commerce, intermediate in the Mhoon and highest in the Sharkey group. The variations in the other chemical data were relatively small among horizons and among the three groups of soils.

Table 6 .-Physical properties of Commerce group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
$1A_p$	1	0-10	Weak coarse granular	Friable	Dr.gr.br.
A-C	1	11-20	Weak coarse granular	Friable	Br.mot.gr.
C	1	21-30	Weak coarse granular	V. friable	Br.mot.gr.
2Ap	sil	0-9	Med. coarse granular	Friable	Dr.gr.br.
A-C	1	10-20	Med.subang.blocky	Sli.plastic	Dr.br.mot.gr.
C	cl	21-30	Mod.med.subang.blocky	Sli.plastic	Br.mot.gr.
3Ap	sil	0-8	Weak granular	Friable	Dr.gr.br.
A-C	sil	10-20	Pla.and weak subang.blocky	Friable	Dr.Br.
C	1	21-30	Weak subang.blocky	Friable	Dr.gr.br.mot.gr.
4Ap	sl	0-11	Weak coarse granular	Friable	Dr.gr.br.
A-C	1	12-20	Weak subang.blocky	Friable	Dr.gr.br.mot.dr.br.
C	1	21-30	Blocky	Sli.plastic	Dr.gr.mot.gr. & br.
5Ap	sil	0-10	Mod.med. and fine granular	Friable	Dr.gr.br.
A-C	1	11-20	Mod. fine subang. blocky	Friable	Dr.gr.br.mot.dr.br.
C	1	21-30	Fine subang.blocky	Friable	Dr.gr.mot.dr.br.
6Ap	sl	0-10	Weak granular	V. friable	Dr.gr.br.
A-C	sl	11-20	Weak fine subang.blocky	Friable	Dr.br.
C	ls	21-30	Weak fine subang.blocky	Friable	Dr.br.mot.gr.
7Ap	sl	0-9	Weak fine granular and pla.	Friable	Dr.gr.br.
A-C	1	10-20	Weak subang.blocky.	Friable	Dr.gr.br.mot.gr.
C	cl	21-30	Weak subang.blocky	Sli.plastic	Dr.gr.br.mot.gr. & br.

(Continued)

Table 6 .-(Continued) Physical properties of Commerce group soils.

Loc. No. and Horizon	Texture[1]	Depth, Inches	Structure[2]	Consistency[3]	Color[4]
8Ap	sil	0-8	Weak granular	Friable	Dr.gr.br.
A-C	sil	9-20	Weak subang.blocky	Friable	Dr.gr.br.
C	sil	21-30	Weak subang.blocky	Friable	Dr.gr.mot.br. & gr.br.
9Ap	sil	0-8	Med.fine granular	Friable	Dr.gr.br.
A-C	sil	10-20	Weak pla. and weak subang.blocky	Sli.plastic	Dr.gr.br.mot.gr. & br.
C	sil	21-30	Weak subang.blocky	Friable	Gr.mot.v.dr.br.
10Ap	l	0-8	Granular	Friable	Dr.gr.br.
A-C	l	9-20	Weak blocky	Friable	Br.mot.gr.br.
C	l	21-30	Blocky	Friable	Br.mot.gr.
11Ap	sil	0-12	Weak coarse blocky	Friable	V.dr.gr.br.
A-C	cl	13-20	Weak granular	Friable	Dr.br.mot.gr.
C	sil	21-30	Weak coarse granular	Friable	Gr.lenses dr.br.
12Ap	sil	0-10	Weak coarse granular	Friable	Dr.gr.br.
A-C	sicl	11-20	Strongly pla.and blocky	Sli.plastic	Dr.br.
C	sil	21-30	Strongly pla.and blocky	Sli.plastic	Br.gr.mot.dr.gr.br.
13Ap	sil	0-9	Granular	Friable	Dr.gr.br.
A-C	sil	10-20	Blocky	Friable	Br.mot.gr.br.
C	sil	21-30	Blocky	Friable	Dr.gr.br.mot.br. & gr.
14Ap	sil	0-10	Granular	Friable	Dr.gr.br.
A-C	sil	11-20	Blocky	Friable	Dr.gr.br.
C	sil	21-30	Blocky	Friable	Gr.mot.dr.gr.br.

(Continued)

Table 6.-(Continued) Physical properties of Commerce group soils.

Loc. No. and Horizon	Texture [1]	Depth, Inches	Structure [2]	Consistency [3]	Color [4]
15Ap	sil	0-9	Weak med.granular	Friable	V.dr.gr.br.
A-C	l	10-20	Weak coarse granular	Friable	Dr.gr.br.mot.gr.
C	sl	21-30	Weak coarse granular	Friable	Br.mot.dr.gr.br. & gr.
16Ap	sil	0-8	Granular	Friable	Dr.gr.br.
A-C	sicl	9-19	Blocky	Friable	Br.mot.gr.br.
C	sil	20-30	Blocky	Friable	Gr.br.mot.gr.
17Ap	sil	0-9	Granular	Friable	Br.
A-C	sil	10-20	Pla. and blocky	Sli.plastic	Gr.br.
C	cl	21-30	Blocky	Plastic	Gr.mot.dr.gr.
18Ap	sl	0-12	Med.coarse and fine granular	Friable	Dr.gr.br.
A-C	l	13-20	Weak med.subang.blocky	Friable	Dr.br.mot.gr.
C	l	21-30	Weak med.subang.blocky	Friable	Yel.br.mot.gr.
19Ap	sil	0-10	Mod.med.and fine granular	Friable	Dr.gr.br.
A-C	sil	11-20	Weak med.blocky	Sli.plastic	Br.mot.gr. & dr.gr.
C	sil	21-30	Weak med.subang.blocky	Sli.plastic	Dr.br.mot.gr.
20Ap	sil	0-12	Weak fine granular	Friable	Dr.gr.br.
A-C	sil	13-20	Weak fine subang.blocky	Friable	V.dr.gr.br.
C	sil	21-30	Weak fine subang.blocky	Friable	V.dr.gr.br.
21Ap	sil	0-12	Granular	Friable	Dr.gr.br.
A-C	sicl	13-22	Weak blocky	Friable	Gr.br.mot.gr.
C	sil	23-30	Weak blocky	Friable	Br.mot.gr.

(Continued)

Table 6 .-(Continued) Physical properties of Commerce group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
22Ap	sl	0-9	Granular	Friable	Dr.gr.br.
A-C	l	10-19	Weak blocky	Friable	Dr.gr.br.
C	sl	20-30	Weak blocky	Friable	Br.mot.gr.
23Ap	sil	0-10	Fine granular	Friable	Dr.br.
A-C	sicl	11-20	Weak fine subang.blocky	Sli.plastic	Br.mot.gr. & dr.gr.
C	sicl	21-30	Weak med.subang.blocky	Friable	Gr.mot.dr.gr. & br.
24Ap	sil	0-12	Mod.med.granular	Friable	V.dr.gr.br.
A-C	sicl	13-20	Med.fine subang.blocky	Sli.plastic	Br.mot.dr.gr.
C	sil	21-30	Weak med.subang.blocky	Friable	Br.mot.gr.
25Ap	sil	0-8	Granular	Friable	Dr.gr.br.
A-C	sil	9-20	Blocky	Friable	Br.mot.gr.br.
C	l	21-30	Weak blocky	Friable	Br.mot.gr.br.
26Ap	sil	0-11	Mod.med.and fine granular	Friable	Br.
A-C	sil	12-20	Weak med.subang.blocky	Friable	Br.mot.dr.br. & dr.gr.
C	sil	21-30	Weak med.subang.blocky	Friable	Br.mot.gr.
27Ap	l	0-9	Med.finegranular	Friable	Dr.br.
A-C	sil	10-20	Weak fine subang.blocky	Friable	Br.mot.gr.
C	sil	21-30	Med.fine subang.blocky	Friable	Gr.mot.br.
28Ap	sil	0-12	Mod.fine granular	Friable	Dr.gr.
A-C	sil	13-20	Med.fine subang.blocky	Friable	Br.mot.gr.
C	sil	21-30	Mod.med.subang.blocky	Sli.plastic	Gr.mot.br.

[1/] sl = sandy loam; l = loam; sil = silt loam; sicl = silty clay loam; cl = clay loam.

[2/] med. = medium; mod. = moderately; subang. = subangular; pla. = platy.

[3/] v. = very; sli. = slightly.

[4/] v. = very; dr. = dark; gr. = gray, grayish; br. = brown; mot. = mottled.

Table 7.-Potassium and sodium contents of the Commerce group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
$1A_p$	238	226	1.76	22	12	1.44
A-C	115	85	1.80	23	14	1.46
C	106	65	1.82	37	17	1.40
$2A_p$	146	140	1.84	27	28	1.45
A-C	111	98	1.92	99	83	1.44
C	133	128	1.90	115	98	1.73
$3A_p$	117	121	1.86	19	20	1.40
A-C	131	123	2.00	60	52	1.32
C	116	96	1.93	55	44	1.36
$4A_p$	132	110	1.80	27	18	1.38
A-C	123	105	1.93	51	37	1.32
C	119	130	1.98	47	49	1.28
$5A_p$	188	192	1.84	41	25	1.21
A-C	133	117	1.94	46	37	1.19
C	138	128	2.01	59	44	1.28
$6A_p$	91	92	1.78	36	13	1.25
A-C	89	88	1.80	15	17	1.26
C	72	55	1.72	21	15	1.28
$7A_p$	105	91	1.81	32	27	1.25
A-C	122	96	1.95	55	43	1.40
C	179	157	1.92	64	56	1.32
$8A_p$	91	106	1.88	46	62	1.44
A-C	102	110	2.02	133	115	1.42
C	118	131	2.14	179	159	1.45
$9A_p$	117	130	1.92	40	43	1.36
A-C	138	147	1.93	68	77	1.28
	170	146	1.98	87	75	1.23
$10A_p$	117	128	1.84	221	179	1.18
A-C	76	67	1.97	121	96	1.09
C	88	75	1.95	123	90	1.08

(Continued)

Table 7.-(Continued) Potassium and sodium contents of the Commerce group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
11A_p	239	231	2.02	33	27	1.30
A-C	126	124	2.04	69	54	1.29
C	97	97	1.99	46	58	1.32
12A_p	125	143	1.95	37	62	1.36
A-C	124	132	1.92	73	84	1.25
C	147	111	1.90	64	70	1.23
13A_p	112	133	1.97	67	49	1.26
A-C	101	98	1.95	87	67	1.20
C	127	121	2.00	88	66	1.13
14A_p	106	131	1.95	98	58	1.24
A-C	93	86	1.92	99	73	1.13
C	109	111	1.98	100	77	1.15
15A_p	124	132	1.98	33	54	1.19
A-C	102	99	1.88	51	60	1.10
C	96	68	1.86	37	46	1.12
16A_p	162	203	2.04	64	42	1.17
A-C	112	121	2.09	84	57	1.13
C	119	100	2.10	104	62	1.15
17A_p	85	113	1.92	55	41	1.08
A-C	81	74	2.09	97	54	1.07
C	104	107	2.04	100	66	1.19
18A_p	82	89	1.65	10	49	1.28
A-C	81	85	1.83	87	96	1.19
C	81	93	1.78	105	125	1.20
19A_p	164	197	1.95	37	63	1.25
A-C	113	131	2.18	72	69	1.21
C	125	146	2.16	83	76	1.23
20A_p	92	107	1.92	72	51	1.20
A-C	83	79	1.90	139	89	1.26
C	70	70	1.98	139	110	1.19

(Continued)

Table 7.-(Continued) Potassium and sodium contents of the Commerce group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
21A_p	143	172	1.95	46	28	1.08
A-C	140	107	2.04	73	37	1.05
C	118	83	1.93	64	37	1.06
22A_p	142	194	1.92	41	25	1.36
A-C	72	69	1.95	59	42	1.32
C	72	59	1.90	67	39	1.21
23A_p	96	114	1.86	55	49	1.19
A-C	115	131	2.00	132	105	1.04
C	119	147	2.02	131	107	1.21
24A_p	202	225	1.98	64	32	1.22
A-C	191	212	2.09	88	54	0.98
C	193	199	2.04	83	52	1.06
25A_p	106	96	1.98	98	78	1.35
A-C	118	79	2.04	86	51	1.32
C	122	91	2.05	67	39	1.28
26A_p	106	116	2.01	67	43	1.24
A-C	110	101	2.02	99	72	1.20
C	83	83	2.04	92	69	1.21
27A_p	117	96	1.84	71	23	1.22
A-C	140	79	1.92	92	38	1.24
C	166	104	1.88	123	56	1.19
28A_p	86	92	1.95	59	39	1.40
A-C	93	107	2.09	122	77	1.17
C	97	104	2.11	106	72	1.20

Table 8.-Calcium and magnesium contents of the Commerce group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
$1A_p$	4255	1429	0.92	1024	363	0.53
A-C	6653	1925	0.86	1351	543	0.56
C	8050	1948	1.18	1927	423	0.55
$2A_p$	1181	1038	0.64	213	243	0.52
A-C	2786	2920	0.70	419	564	0.57
C	3024	3191	0.67	521	735	0.74
$3A_p$	1177	1086	1.01	183	259	0.72
A-C	2681	2620	1.02	464	583	0.81
C	1942	1708	1.09	327	450	0.70
$4A_p$	1924	1225	1.15	208	273	0.57
A-C	1890	2198	1.16	421	616	0.83
C	2579	2729	0.94	558	812	0.84
$5A_p$	4369	2206	1.18	940	546	0.75
A-C	7482	2726	1.29	1640	561	0.88
C	7586	2911	1.33	1640	575	0.86
$6A_p$	1414	1162	1.00	303	409	0.54
A-C	1527	1308	1.11	325	446	0.70
C	2881	1031	1.15	829	440	0.80
$7A_p$	3237	1143	1.18	840	389	0.46
A-C	7844	2111	1.38	1673	520	0.81
C	8823	3323	1.29	1641	706	0.92
$8A_p$	1320	1422	0.97	301	340	0.58
A-C	1946	2172	0.90	383	523	0.77
C	2371	4185	0.92	501	670	0.81
$9A_p$	1575	1829	0.86	223	381	0.54
A-C	4652	4022	1.04	619	665	0.79
C	9050	4319	1.49	1769	576	0.94
$10A_p$	1590	1844	0.79	252	420	0.72
A-C	2273	2615	0.78	444	703	0.87
C	2403	2749	0.77	575	836	0.93

(Continued)

Table 8.-(Continued) Calcium and magnesium contents of the Commerce group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
$11A_p$	1742	1781	1.02	209	326	0.49
A-C	2964	3058	0.89	468	671	0.82
C	2377	2749	0.94	393	630	0.78
$12A_p$	2046	2189	0.97	266	419	0.67
A-C	3737	3489	0.85	633	734	0.88
C	8944	4205	1.52	1846	549	0.84
$13A_p$	2142	2213	1.01	261	387	0.70
A-C	2952	3010	1.07	493	624	0.79
C	5449	3406	1.12	1079	796	1.11
$14A_p$	2355	2561	1.00	359	507	0.86
A-C	3956	3008	0.89	498	623	0.95
C	3545	3255	0.86	703	777	0.98
$15A_p$	2938	2887	1.01	402	531	0.71
A-C	5065	2602	1.18	1147	599	0.75
C	6310	1650	1.31	1324	412	0.79
$16A_p$	3309	3268	0.97	408	574	0.86
A-C	3640	4013	0.89	578	751	1.02
C	8456	3623	1.18	1608	767	1.08
$17A_p$	1578	1670	1.02	214	331	0.57
A-C	3005	3099	0.94	461	623	0.79
C	3553	3490	1.03	575	799	0.76
$18A_p$	1115	1398	0.72	201	339	0.39
A-C	2372	2627	0.78	527	781	0.44
C	2544	2648	0.77	558	827	0.47
$19A_p$	2352	2382	0.86	349	544	0.43
A-C	3240	3208	0.81	458	686	0.50
C	3325	3367	0.80	483	759	0.54
$20A_p$	1883	1905	0.78	210	333	0.50
A-C	3392	2611	0.89	267	380	0.56
C	3293	2572	0.86	268	427	0.54

(Continued)

Table 8.-(Continued) Calcium and magnesium contents of the Commerce group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
21Ap	3570	2275	1.13	796	685	0.73
A-C	8795	4188	1.48	1885	879	0.84
C	9163	4057	1.72	1808	519	0.83
22Ap	1419	1419	1.05	208	355	0.51
A-C	2655	2226	1.06	403	531	0.48
C	4366	1796	1.26	979	469	0.59
23Ap	1431	1636	0.65	210	344	0.64
A-C	3250	3547	0.72	483	819	0.90
C	3142	3356	0.68	524	865	0.88
24Ap	2556	2638	1.01	266	455	0.52
A-C	3873	3709	0.75	597	964	0.82
C	5372	3354	1.02	973	756	0.74
25Ap	6207	3531	1.24	672	560	0.87
A-C	11880	3832	1.73	1803	451	0.96
C	8526	2354	1.60	1796	315	1.04
26Ap	1748	1789	0.73	235	419	0.75
A-C	4653	3143	0.97	491	648	0.76
C	2778	2470	1.02	423	617	0.77
27Ap	7123	2707	1.42	1587	321	0.71
A-C	13350	3453	1.69	2209	426	0.75
C	14750	4615	1.56	2495	769	0.92
28Ap	1744	1878	0.81	225	352	0.74
A-C	2553	2637	0.75	507	716	0.90
C	2562	2526	0.77	575	751	0.94

Table 9.-Phosphorus, sulphur, carbon and nitrogen contents of the Commerce group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	
1Ap	596	728	4.1	0.514	0.048	10.7
A-C	310	546	3.7	0.276	0.028	9.9
C	303	601	2.9	0.289	0.024	12.0
2Ap	385	595	5.5	0.394	0.050	7.9
A-C	322	661	2.5	0.431	0.052	8.3
C	264	574	3.7	0.436	0.051	8.5
3Ap	267	441	6.1	0.387	0.048	8.1
A-C	217	511	6.1	0.398	0.051	7.8
C	297	508	7.1	0.189	0.032	5.9
4Ap	326	519	6.3	0.389	0.046	8.5
A-C	268	562	6.5	0.427	0.047	9.1
C	252	597	6.5	0.502	0.056	9.0
5Ap	341	562	12.3	0.704	0.067	10.5
A-C	293	583	7.1	0.389	0.036	10.8
C	294	366	9.1	0.340	0.033	10.3
6Ap	274	452	4.9	0.460	0.048	9.6
A-C	271	511	4.1	0.427	0.048	8.9
C	276	527	5.2	0.294	0.033	8.9
7Ap	284	455	6.1	0.376	0.034	11.1
A-C	265	551	6.9	0.325	0.028	11.6
C	249	599	6.2	0.437	0.042	10.4
8Ap	242	436	7.6	0.294	0.035	8.4
A-C	241	511	6.9	0.279	0.039	7.2
C	300	532	5.1	0.274	0.034	8.1
9Ap	215	377	12.5	0.424	0.049	8.7
A-C	273	516	10.5	0.334	0.041	8.1
C	283	540	17.9	0.348	0.035	9.9
10Ap	171	404	8.6	0.638	0.076	8.4
A-C	136	409	11.2	0.561	0.062	9.0
C	229	556	13.5	0.321	0.031	10.4

(Continued)

Table 9.-(Continued) Phosphorus, sulphur, carbon and nitrogen contents of the Commerce group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	
11Ap	343	677	9.9	0.897	0.080	11.2
A-C	261	540	5.0	0.340	0.046	7.4
C	312	556	3.1	0.212	0.042	5.0
12Ap	231	420	6.2	0.781	0.073	10.7
A-C	263	527	3.6	0.402	0.049	8.2
C	276	441	7.4	0.363	0.034	10.7
13Ap	266	487	7.8	0.740	0.064	11.6
A-C	297	554	7.4	0.416	0.042	9.9
C	296	567	7.2	0.503	0.043	11.7
14Ap	254	495	6.6	0.789	0.074	10.7
A-C	290	572	6.4	0.563	0.049	11.5
C	325	575	6.1	0.444	0.039	11.4
15Ap	268	538	4.9	0.684	0.071	9.6
A-C	288	519	2.8	0.295	0.032	9.2
C	333	605	3.7	0.230	0.020	11.5
16Ap	293	631	4.7	1.089	0.102	10.7
A-C	239	597	6.1	0.702	0.064	11.0
C	281	602	4.5	0.522	0.043	12.1
17Ap	280	535	6.1	0.853	0.085	10.0
A-C	220	602	6.3	0.670	0.077	8.7
C	261	687	6.0	0.628	0.071	8.8
18Ap	168	350	6.4	0.541	0.048	11.3
A-C	169	500	5.0	0.405	0.042	9.6
C	250	564	5.9	0.302	0.031	9.7
19Ap	272	551	8.2	0.814	0.081	10.0
A-C	224	556	5.6	0.521	0.063	8.3
C	277	607	4.8	0.398	0.046	8.7
20Ap	627	883	9.2	0.832	0.083	10.0
A-C	1100	1287	6.8	0.828	0.083	10.0
C	1320	1383	5.0	0.810	0.080	10.1

(Continued)

Table 9.-(Continued) Phosphorus, sulphur, carbon and nitrogen contents of the Commerce group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	
21Ap	276	551	4.9	0.722	0.063	11.5
A-C	215	543	3.1	0.596	0.045	13.2
C	229	546	2.8	0.361	0.029	12.4
22Ap	390	615	6.7	0.688	0.063	10.9
A-C	347	629	6.4	0.630	0.057	11.1
C	337	682	6.3	0.339	0.031	10.9
23Ap	135	361	10.3	0.641	0.071	9.0
A-C	233	594	7.4	0.343	0.050	6.9
C	247	567	7.5	0.284	0.039	7.3
24Ap	383	583	17.5	0.680	0.074	9.2
A-C	432	776	8.6	0.628	0.071	8.8
C	440	712	9.0	0.452	0.045	10.0
25Ap	283	519	6.1	0.687	0.056	12.3
A-C	291	583	4.8	0.468	0.035	13.4
C	299	530	4.6	0.347	0.025	13.9
26Ap	249	503	5.4	0.608	0.066	9.2
A-C	283	618	1.6	0.361	0.041	8.8
C	335	615	1.4	0.283	0.027	10.5
27Ap	316	589	4.8	0.602	0.057	10.6
A-C	228	548	6.1	0.407	0.032	12.7
C	211	570	4.9	0.442	0.041	10.8
28Ap	243	530	3.7	0.684	0.073	9.4
A-C	273	599	4.8	0.416	0.042	9.9
C	282	597	4.6	0.381	0.039	9.8

Table 10.-Clay content, exchange properties, and pH of the Commerce group soils.

Loc. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./ 100g	m.e./ 100g	m.e./ 100g	%	
1Ap	8.9	10.77	-	10.77	100+	7.7
A-C	12.8	14.36	-	14.36	100+	8.0
C	12.7	13.44	-	13.44	100+	8.1
2Ap	10.1	9.49	1.83	7.66	80.7	5.3
A-C	24.6	21.60	1.77	19.83	91.8	6.2
C	30.0	24.21	1.48	22.73	93.9	6.2
3Ap	11.4	9.83	1.88	7.95	90.0	5.1
A-C	21.9	19.82	1.41	18.41	92.9	6.3
C	12.8	13.30	0.64	12.66	95.2	6.7
4Ap	13.9	9.41	0.74	8.67	92.1	6.3
A-C	21.8	17.68	1.20	16.48	93.2	6.3
C	24.6	21.79	0.96	20.83	95.6	6.8
5Ap	15.3	16.11	-	16.11	100+	7.7
A-C	17.9	18.68	-	18.68	100+	7.8
C	20.5	19.78	-	19.78	100+	8.0
6Ap	13.7	9.73	-	9.73	100+	7.4
A-C	12.7	10.52	0.02	10.50	99.8	7.1
C	8.8	8.97	-	8.97	100+	7.6
7Ap	11.4	9.31	0.05	9.26	99.5	7.1
A-C	15.3	15.25	-	15.25	100+	7.6
C	28.6	23.05	-	23.05	100+	7.6
8Ap	12.7	11.18	0.76	10.44	93.4	6.1
A-C	20.5	16.52	0.60	15.92	96.4	7.0
C	20.6	27.63	0.21	27.42	99.2	7.8
9Ap	12.7	13.38	0.60	12.78	95.5	6.6
A-C	23.2	26.25	-	26.25	100+	7.5
C	19.3	26.99	-	26.99	100+	7.8
10Ap	19.2	15.87	2.10	13.77	86.8	5.9
A-C	24.5	20.64	1.21	19.43	94.1	6.3
C	23.5	22.20	1.02	21.18	95.4	6.7

(Continued)

Table 10.-(Continued) Clay content, exchange properties, and pH of the Commerce group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./ 100g	m.e./ 100g	m.e./ 100g	%	
11Ap	14.0	13.77	1.49	12.28	89.2	5.9
A-C	27.3	22.55	1.22	21.33	94.6	6.4
C	20.7	20.51	1.11	19.40	94.6	6.9
12Ap	16.6	15.56	0.55	15.01	96.5	7.3
A-C	27.3	24.16	-	24.16	100+	7.7
C	16.7	26.07	-	26.07	100+	8.2
13Ap	11.5	15.27	0.50	14.77	96.7	7.0
A-C	19.5	20.69	-	20.69	100+	7.7
C	26.2	24.15	-	24.15	100+	7.8
14Ap	16.6	18.19	0.65	17.54	96.4	6.8
A-C	19.4	20.67	-	20.67	100+	7.7
C	23.5	23.24	-	23.24	100+	7.8
15Ap	19.3	19.35	-	19.35	100+	7.5
A-C	16.6	18.42	-	18.42	100+	7.9
C	11.5	11.99	-	11.99	100+	7.9
16Ap	22.0	23.04	1.31	21.73	94.3	6.3
A-C	30.2	27.42	0.66	26.76	97.6	7.1
C	26.1	24.92	-	24.92	100+	7.8
17Ap	12.7	14.05	2.53	11.52	82.0	5.2
A-C	23.3	22.37	1.37	21.00	93.9	6.3
C	30.0	25.72	1.17	24.55	95.5	6.6
18Ap	10.1	11.05	0.84	10.21	92.4	6.7
A-C	22.0	20.82	0.65	20.17	96.9	7.3
C	20.7	21.09	0.30	20.79	98.6	7.8
19Ap	19.3	18.68	1.55	17.13	91.7	5.9
A-C	26.9	23.30	1.01	22.29	95.7	6.8
C	26.0	24.39	0.65	23.74	97.3	7.2
20Ap	14.1	15.84	3.10	12.74	80.4	5.4
A-C	18.0	19.74	2.96	16.78	85.0	6.1
C	15.4	19.16	2.16	17.00	88.7	6.6

(Continued)

Table 10.-(Continued) Clay content, exchange properties, and pH of the Commerce group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./ 100g	m.e./ 100g	m.e./ 100g	%	
21Ap	16.6	17.32	-	17.32	100+	7.7
A-C	28.8	28.56	-	28.56	100+	7.9
C	18.0	24.88	-	24.88	100+	8.1
22Ap	10.1	11.64	1.03	10.63	91.2	6.2
A-C	15.3	16.29	0.45	15.84	97.2	7.3
C	12.8	13.14	-	13.14	100+	7.7
23Ap	11.5	13.74	2.25	11.49	83.6	5.1
A-C	31.5	27.03	1.79	25.24	93.4	6.3
C	27.5	26.24	1.53	24.71	94.2	6.3
24Ap	15.3	18.26	0.64	17.62	96.5	6.5
A-C	30.1	28.08	0.87	27.21	96.9	6.9
C	23.3	23.70	-	23.70	100+	7.5
25Ap	12.7	22.82	-	22.82	100+	8.2
A-C	12.8	23.25	-	23.25	100+	8.2
C	8.9	14.74	-	14.74	100+	8.3
26Ap	14.1	14.36	1.49	12.87	89.6	5.8
A-C	23.3	21.58	-	21.58	100+	7.7
C	18.0	17.91	-	17.91	100+	8.0
27Ap	11.4	16.50	-	16.50	100+	7.6
A-C	15.4	21.10	-	21.10	100+	8.0
C	22.1	29.86	-	29.86	100+	8.0
28Ap	25.5	14.52	1.85	12.67	87.3	5.8
A-C	24.7	20.66	1.01	19.65	95.1	6.7
C	24.6	20.06	0.70	19.36	96.5	7.1

Table 11.-Physical properties of the Mhoon group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
1Ap	sicl	0-8	Granular	Friable	Gr.br.
A-C	sic	9-20	Blocky	Plastic	Gr.mot.br.
C	sic	20-30	Blocky	Plastic	Gr.
2Ap	sicl	0-8	Blocky	Friable	Dr.gr.br.
A-C	sic	10-20	Weak blocky	Sli. plastic	Dr.gr.br.
C	sic	20-30	Weak blocky	Plastic	Gr.mot.br.
3Ap	sil	0-9	Mod. med. granular	Sli. plastic	Dr.br.
A-C	sil	10-16	Mod. med. subang. blocky	Sli. plastic	Gr.mot.dr.br.
C	sil	18-30	Weak subang. blocky	Friable	Gr.mot.dr.br.
4Ap	sicl	0-9	Subang. blocky	Sli. plastic	V.dr.gr.br.
A-C	sicl	11-20	Med. subang. blocky	Sli. plastic	Gr.mot.br.
C	sic	22-30	Weak subang. blocky	Sli. plastic	Gr.mot.br.
5Ap	sicl	0-7	Fine subang. blocky	Friable	V.dr.gr.
A-C	sicl	9-15	Med. subang. blocky	Sli. plastic	V.dr.gr.br.
C	sic	17-30	Weak med. subang. blocky	Sli. plastic	Dr.gr.mot.gr.
6Ap	sil	0-10	Granular	Friable	V.dr.gr.br.
A-C	sic	12-20	Blocky	Plastic	Gr.mot.br.
C	sic	20-30	Blocky	Plastic	Gr.mot.br.

(Continued)

Table 11.-(Continued) Physical properties of the Mhoon group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
7Ap	sicl	0-8	Blocky	Sli. plastic	V.dr.gr.br.
A-C	sicl	9-17	Weak blocky	Sli. plastic	Gr.mot.br.
C	sicl	18-30	Weak blocky	Friable	Gr.mot.br.
8Ap	sil	0-8	Granular	Friable	Dr.gr.
A-C	sil	12-18	Weak blocky	Friable	Dr.gr.
C	sil	24-30	Weak blocky	Friable	Dr.gr.
9Ap	sil	0-10	Granular	Friable	V.dr.br.
A-C	sicl	11-20	Blocky	Sli. plastic	Dr.gr.mot.br.
C	sicl	20-30	Weak blocky	Friable	Dr.gr.mot.br.
10Ap	sil	0-6	Granular	Friable	Dr.gr.br.
A-C	sicl	8-20	Weak blocky	Sli. plastic	Dr.gr.
C	sicl	20-30	Weak blocky	Sli. plastic	Dr.gr.mot.gr.br.
11Ap	sil	0-8	Granular	Friable	V.dr.gr.br.
A-C	sicl	10-20	Weak blocky	Sli. plastic	Gr.mot.br.
C	sicl	20-30	Weak blocky	Sli. plastic	Gr.mot.br.
12Ap	sil	0-10	Granular	Friable	V.dr.gr.br.
A-C	sicl	12-21	Weak blocky	Friable	Gr.mot.br.
C	sic	21-30	Weak blocky	Friable	Gr.mot.br.

(Continued)

Table 11.-(Continued) Physical properties of the Mhoon group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
13Ap	sicl	0-9	Granular	Friable	Dr.br.
A-C	sicl	10-20	Weak blocky	Friable	Br.mot.gr.
C	sicl	20-30	Weak blocky	Friable	Gr.mot.br.
14Ap	sicl	0-8	Granular	Sli. plastic	V.dr.gr.br.
A-C	sicl	10-20	Weak blocky	Sli. plastic	Gr.mot.br.
C	sicl	20-30	Weak blocky	Friable	Gr.mot.br.
15Ap	sil	0-8	Granular	Friable	V.dr.gr.br.
A-C	sil	10-23	Weak blocky	Friable	Dr.gr.mot.br.
C	sicl	23-30	Weak blocky	Friable	Dr.gr.
16Ap	sil	0-9	Granular	Friable	V.dr.gr.br.
A-C	sic	10-20	Weak blocky	Sli. plastic	Gr.mot.br.
C	sic	20-30	Weak blocky	Sli. plastic	Gr.mot.br.
17Ap	c	0-9	Fine blocky	Sli. plastic	Dr.gr.
A-C	c	10-20	Weak blocky	Sli. plastic	Gr.
C	c	22-30	Weak blocky	Sli. plastic	Gr.
18Ap	sil	0-7	Granular	Friable	V.dr.gr.br.
A-C	sic	8-20	Blocky	Plastic	Gr.mot.br.
C	sic	20-30	Blocky	Plastic	Gr.mot.br.

(Continued)

Table 11.-(Continued) Physical properties of the Mhoon group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
19Ap	sil	0-9	Granular	Friable	Dr.gr.br.
A-C	sicl	10-20	Weak blocky	Friable	Gr.mot.br.
C	sicl	20-30	Weak blocky	Friable	Gr.mot.br.
20Ap	sil	0-10	Granular	Friable	Dr.gr.br.
A-C	sil	12-20	Weak blocky	Sli. plastic	Dr.gr.dr.gr.br.
C	sil	20-30	Weak blocky	Friable	Dr.gr.dr.gr.br.
21Ap	sicl	0-9	Granular	Friable	V.dr.gr.br.
A-C	sicl	10-16	Weak blocky	Sli. plastic	Gr.mot.br.
C	sil	18-30	Weak blocky	Friable	Gr.mot.br.
22Ap	sicl	0-9	Granular	Friable	V.dr.gr.br.
A-C	sicl	10-20	Weak blocky	Plastic	Gr.mot.br.
C	sic	20-30	Weak blocky	Sli. plastic	Gr.mot.br.
23Ap	sil	0-9	Granular	Friable	V.dr.gr.br.
A-C	sic	10-20	Weak blocky	Sli. plastic	Gr.mot.br.
C	sic	20-30	Weak blocky	Sli. plastic	Gr.mot.br.
24Ap	sicl	0-9	Med. ang. blocky	Sli. plastic	Dr.br.
A-C	sicl	10-14	Ang. blocky	Plastic	V.dr.gr.mot.br.
C	sic	16-30	Weak subang. blocky	Sli. plastic	Gr.mot.br.

(Continued)

Table 11.-(Continued) Physical properties of the Mhoon group soils.

Loc. No. and Horizon	Texture[1/]	Depth, Inches	Structure[2/]	Consistency[3/]	Color[4/]
25Ap	sil	0-10	Strong fine granular	Sli. plastic	V.dr.gr.br.
A-C	sil	11-17	Med. subang. blocky	Sli. plastic	Gr.
C	sil	18-30	Fine subang. blocky	Sli. plastic	Gr.mot.br.
26Ap	sil	0-10	Weak coarse granular	Sli. plastic	V.dr.gr.br.
A-C	sicl	11-20	Med. subang. blocky	Sli. plastic	Gr.mot.br.
C	sicl	20-30	Weak subang. blocky	Friable	Gr.mot.br.
27Ap	sicl	0-8	Granular	Friable	V.dr.gr.br.
A-C	sicl	10-20	Weak blocky	Friable	Gr.mot.br.
C	sicl	20-30	Weak blocky	Sli. plastic	Gr.mot.br.
28Ap	sil	0-9	Granular	Friable	V.dr.br.
A-C	sil	10-20	Blocky	Sli. plastic	V.dr.gr.br.
C	sicl	20-30	Weak blocky	Sli. plastic	Gr.mot.br.
29Ap	sicl	0-9	Granular	Friable	V.dr.gr.br.
A-C	sic	10-20	Weak blocky	Plastic	Gr.mot.br.
C	sicl	20-30	Weak blocky	Friable	Br.mot.gr.
30Ap	sil	0-9	Strong med. granular	Sli. plastic	Dr.gr.br.
A-C	sicl	10-20	Weak subang. blocky	Sli. plastic	Dr.gr.mot.gr.
C	sil	20-30	Weak subang. blocky	Sli. plastic	Dr.gr.mot.gr.

[1/] sil = silt loam; sicl = silty clay loam; sic = silty clay; c = clay.

[2/] mod. = moderately; med. = medium; subang. = subangular.

[3/] sli. = slightly.

[4/] v. = very; dr. = dark; gr. = gray, grayish; br. = brown; mot. = mottled.

Table 12.-Potassium and sodium contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
1Ap	420	588	1.88	97	26	1.20
A-C	257	356	2.04	119	37	1.08
C	236	337	2.16	120	46	1.00
2Ap	289	380	1.94	97	32	1.20
A-C	243	332	1.96	122	35	1.10
C	255	372	2.00	113	43	1.00
3Ap	207	235	1.92	61	151	1.28
A-C	161	191	1.92	87	166	1.32
C	154	144	1.80	86	153	1.52
4A	325	367	1.80	63	215	1.24
A-C	216	258	1.76	82	218	1.20
C	232	278	1.80	93	233	1.44
5Ap	271	319	1.80	76	199	1.28
A-C	282	311	1.92	62	192	1.24
C	300	319	1.80	90	272	1.04
6Ap	158	179	1.80	63	27	1.36
A-C	260	279	2.00	108	61	1.20
C	198	384	2.08	126	92	1.22
7Ap	266	341	1.72	76	39	1.36
A-C	247	313	1.72	90	49	1.36
C	268	314	1.68	109	73	1.28
8Ap	195	205	1.95	50	23	1.66
A-C	154	143	2.02	71	32	1.76
C	217	199	1.90	72	34	1.49
9Ap	196	272	1.88	66	45	1.36
A-C	264	342	1.84	89	58	1.26
C	243	315	2.02	108	70	1.24
10Ap	124	144	2.14	55	36	1.82
A-C	253	305	2.37	99	79	1.50
C	231	285	2.27	92	78	1.50

(Continued)

Table 12.-(Continued) Potassium and sodium contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
11Ap	315	397	1.90	53	22	1.36
A-C	279	369	1.90	63	42	1.38
C	275	370	1.90	93	59	1.28
12Ap	176	217	1.68	77	39	1.28
A-C	240	256	1.70	90	53	1.36
C	316	412	1.74	131	77	1.16
13Ap	161	218	1.80	97	34	1.18
A-C	167	238	1.96	119	48	1.18
C	180	296	1.96	142	59	1.00
14Ap	245	338	1.66	56	27	1.26
A-C	253	369	1.72	74	46	1.16
C	232	314	1.70	89	56	1.16
15Ap	123	198	1.80	78	41	1.16
A-C	124	200	1.80	95	65	1.16
C	140	218	1.72	85	56	0.96
16Ap	123	162	1.72	92	48	1.46
A-C	220	395	1.94	176	78	1.20
C	213	373	1.96	164	101	1.22
17Ap	383	484	1.92	74	37	1.27
A-C	322	432	1.88	149	100	1.22
C	253	285	1.97	129	96	1.25
18Ap	187	291	1.76	100	41	1.40
A-C	214	355	1.88	148	94	1.22
C	238	442	1.92	186	121	1.08
19Ap	155	236	1.80	95	40	1.40
A-C	157	239	1.84	126	55	1.28
C	169	277	1.84	138	64	1.24
20Ap	122	133	1.89	71	40	1.44
A-C	165	172	1.76	146	120	1.50
C	186	163	1.89	153	111	1.47

(Continued)

Table 12.-(Continued) Potassium and sodium contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
21Ap	218	255	1.66	63	38	1.18
A-C	193	228	1.68	88	48	1.24
C	187	219	1.66	100	58	1.24
22Ap	240	274	1.96	61	33	1.24
A-C	189	221	1.96	86	59	1.24
C	239	288	2.00	110	74	1.16
23Ap	197	209	1.80	72	44	1.32
A-C	211	259	1.96	103	81	1.24
C	232	258	1.94	108	79	1.28
24Ap	177	201	1.88	78	44	1.20
A-C	163	183	2.08	86	56	1.30
C	240	281	2.12	156	114	1.24
25Ap	93	108	1.76	64	139	1.54
A-C	150	144	1.79	82	156	1.66
C	165	144	1.87	95	152	1.57
26Ap	145	145	1.84	70	41	1.48
A-C	200	204	2.08	107	78	1.44
C	177	183	1.88	106	75	1.52
27Ap	187	218	1.88	75	31	1.34
A-C	237	258	2.08	95	49	1.28
C	234	285	2.00	94	52	1.22
28Ap	123	127	1.86	64	40	1.32
A-C	160	145	1.84	81	41	1.30
C	203	237	2.08	82	49	1.30
29Ap	188	238	1.88	67	44	1.24
A-C	239	297	1.98	105	79	1.26
C	182	219	1.98	99	75	1.16
30Ap	124	163	1.87	246	249	1.54
A-C	187	220	1.74	168	141	1.54
C	166	181	1.76	168	139	1.54

Table 13.-Calcium and magnesium contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
1Ap	2926	3622	0.57	745	882	0.60
A-C	4892	5115	0.74	1445	1181	0.90
C	4597	5497	0.74	1147	1050	0.91
2Ap	2791	3193	0.67	796	877	0.66
A-C	6431	5535	0.88	1898	1015	0.93
C	5523	5829	0.77	1468	1070	0.90
3Ap	2190	2685	0.92	413	561	0.53
A-C	2444	2999	0.92	653	671	0.63
C	3311	2740	1.12	1100	629	0.63
4Ap	3334	3798	0.92	734	807	0.69
A-C	3226	3635	0.92	864	968	0.76
C	3504	4433	1.08	939	1044	0.90
5Ap	3043	3703	0.92	740	858	0.68
A-C	2964	3562	0.92	814	887	0.72
C	4516	5768	1.12	1134	1161	0.92
6Ap	3167	2200	0.76	1134	527	0.47
A-C	3921	4680	0.70	964	917	0.70
C	4480	5675	0.74	1157	1116	0.80
7Ap	2733	3315	0.54	625	663	0.59
A-C	3079	3807	0.70	746	735	0.67
C	3326	4205	0.76	821	801	0.75
8Ap	2468	3240	0.99	512	437	0.46
A-C	3961	2642	1.47	1197	447	0.58
C	4395	3250	1.41	1310	552	0.60
9Ap	2275	2660	0.69	538	543	0.49
A-C	3440	3970	0.69	844	849	0.73
C	3486	4014	0.70	940	924	0.79
10Ap	2206	2886	0.99	422	361	0.41
A-C	3481	4641	1.08	970	912	0.77
C	3403	4264	0.86	893	931	0.70

(Continued)

Table 13.-(Continued) Calcium and magnesium contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
11Ap	2397	2659	0.70	496	497	0.49
A-C	3222	3922	0.75	811	774	0.68
C	3412	4014	0.74	929	897	0.71
12Ap	2382	2447	0.71	476	507	0.52
A-C	3056	3377	0.80	793	676	0.64
C	4420	5150	0.78	1253	1162	0.88
13Ap	2548	2946	0.57	549	689	0.52
A-C	3023	3695	0.63	667	784	0.58
C	5187	4880	0.73	1521	1109	0.87
14Ap	3526	3739	0.74	970	822	0.69
A-C	4218	4743	0.77	981	905	0.80
C	3941	4426	0.80	1001	848	0.81
15Ap	2362	2732	0.54	637	647	0.48
A-C	2465	3081	0.57	665	743	0.58
C	2349	3092	0.51	644	764	0.61
16Ap	1738	2214	0.64	421	432	0.39
A-C	3849	5055	0.71	1072	1051	0.83
C	3622	4650	0.71	1044	1007	0.83
17Ap	3784	4799	0.85	1116	1169	0.72
A-C	4310	5498	0.99	1211	1360	1.06
C	3329	4156	0.90	948	1023	0.66
18Ap	2275	2819	0.60	665	601	0.51
A-C	3629	4708	0.70	929	916	0.76
C	4281	5704	0.70	1103	1079	0.79
19Ap	1963	2613	0.61	485	533	0.45
A-C	2616	3534	0.72	774	742	0.57
C	3035	3872	0.71	927	793	0.66
20Ap	2190	2806	0.95	520	356	0.39
A-C	3267	3392	0.90	796	567	0.54
C	4384	3430	1.12	1176	578	0.58

(Continued)

Table 13.-(Continued) Calcium and magnesium contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
21Ap	3012	2981	0.67	623	637	0.57
A-C	2755	3178	0.64	699	731	0.59
C	3103	3116	0.77	1073	838	0.72
22Ap	2397	3022	0.52	646	738	0.56
A-C	2774	3439	0.54	883	883	0.60
C	3226	4086	0.56	1157	1142	0.72
23Ap	2616	3081	0.63	571	600	0.52
A-C	3357	4223	0.66	940	943	0.78
C	3333	4219	0.63	939	902	0.76
24Ap	3274	3887	0.72	646	766	0.58
A-C	3397	4073	0.68	860	877	0.63
C	3802	4580	1.04	1196	1252	1.05
25Ap	2060	2456	1.09	515	487	0.50
A-C	2517	2799	1.22	660	631	0.52
C	4186	2707	1.24	1588	703	0.70
26Ap	2384	2811	0.59	560	672	0.51
A-C	3207	3932	0.60	981	942	0.70
C	2590	3053	0.66	804	836	0.51
27Ap	2577	2888	0.58	738	691	0.56
A-C	3557	3850	0.68	1263	995	0.76
C	3571	4000	0.65	1190	1004	0.83
28Ap	2222	2842	0.64	514	487	0.44
A-C	4449	3000	0.89	1759	760	0.71
C	3050	3880	0.66	999	1002	0.75
29Ap	2420	2894	0.47	772	812	0.66
A-C	3187	4180	0.54	1211	1116	0.74
C	2354	3032	0.53	792	319	0.72
30Ap	2905	3750	0.96	515	487	0.58
A-C	3249	4218	0.98	975	877	0.61
C	4179	2877	1.18	1358	753	0.64

Table 14.-Phosphorus, sulphur, carbon and nitrogen contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic Matter	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	%	
1Ap	376	719	12	2.76	1.60	0.162	9.9
A-C	259	562	8	1.26	0.73	0.097	7.5
C	257	540	8	1.19	0.69	0.091	7.6
2Ap	358	640	10	2.31	1.34	0.127	10.6
A-C	242	531	8	1.28	0.74	0.080	9.2
C	248	570	4	1.14	0.66	0.081	8.1
3Ap	342	643	8	1.50	0.87	0.101	8.6
A-C	273	466	18	0.83	0.48	0.061	7.9
C	321	417	16	0.43	0.25	0.042	5.9
4Ap	280	704	8	2.78	1.61	0.158	10.2
A-C	198	489	6	1.09	0.63	0.075	8.4
C	261	537	6	1.05	0.61	0.074	8.2
5Ap	345	671	12	1.86	1.08	0.109	9.9
A-C	330	673	8	2.05	1.19	0.116	10.3
C	140	444	10	1.40	0.81	0.100	8.1
6Ap	329	461	12	1.41	0.82	0.075	10.9
A-C	201	527	6	1.24	0.72	0.080	9.0
C	234	452	8	0.93	0.54	0.061	8.8
7Ap	216	508	16	1.88	1.09	0.111	9.8
A-C	225	449	8	1.34	0.78	0.084	9.3
C	276	467	4	0.79	0.46	0.058	7.9
8Ap	270	410	6	1.21	0.70	0.066	10.6
A-C	290	415	6	0.47	0.27	0.032	8.4
C	318	440	6	0.57	0.33	0.036	9.2
9Ap	284	606	12	1.86	1.08	0.105	10.3
A-C	240	564	6	1.45	0.84	0.088	9.5
C	244	512	6	0.95	0.55	0.062	8.9
10Ap	221	354	6	1.03	0.60	0.059	10.2
A-C	204	517	4	0.91	0.53	0.063	8.4
C	310	690	6	0.43	0.25	0.050	5.0

(Continued)

Table 14.-(Continued) Phosphorus, sulphur, carbon and nitrogen contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic Matter	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	%	
11Ap	212	619	10	2.10	1.22	0.113	10.8
A-C	200	462	6	1.38	0.80	0.082	9.7
C	300	584	8	0.95	0.55	0.059	9.3
12Ap	241	526	4	1.79	1.04	0.105	9.9
A-C	263	469	6	1.03	0.60	0.073	8.2
C	270	496	6	0.93	0.54	0.072	7.5
13Ap	235	550	10	1.83	1.06	0.109	9.7
A-C	254	504	6	1.03	0.60	0.079	7.6
C	273	553	6	0.84	0.49	0.068	7.2
14Ap	238	602	6	1.62	0.94	0.102	9.2
A-C	269	609	6	0.98	0.57	0.067	8.5
C	283	628	6	1.57	0.91	0.097	9.4
15Ap	225	481	12	2.05	1.19	0.118	10.1
A-C	183	457	8	1.10	0.64	0.080	8.0
C	156	249	6	0.64	0.37	0.059	6.3
16Ap	242	394	10	1.41	0.82	0.082	10.0
A-C	255	488	4	0.93	0.54	0.078	6.9
C	278	547	4	0.81	0.47	0.059	8.0
17Ap	143	526	6	2.31	1.34	0.135	9.9
A-C	142	493	6	1.40	0.81	0.101	8.0
C	140	383	4	0.72	0.42	0.056	7.5
18Ap	283	485	8	1.86	1.08	0.110	9.8
A-C	190	489	8	1.33	0.77	0.098	7.8
C	173	427	6	1.12	0.65	0.090	7.2
19Ap	219	484	10	1.67	0.97	0.102	9.5
A-C	228	509	8	1.05	0.61	0.069	8.8
C	289	575	6	0.88	0.51	0.066	7.7
20Ap	236	344	8	0.74	0.43	0.049	8.8
A-C	243	465	4	0.60	0.35	0.043	8.1
C	287	510	4	0.55	0.32	0.046	6.9

(Continued)

Table 14.-(Continued) Phosphorus, sulphur, carbon and nitrogen contents of the Mhoon group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic Matter	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	%	
21Ap	195	446	6	1.69	0.98	0.096	10.2
A-C	195	465	4	1.52	0.88	0.089	9.9
C	312	537	4	0.76	0.44	0.058	7.5
22Ap	233	662	6	2.26	1.31	0.123	10.6
A-C	235	592	4	1.22	0.71	0.073	9.7
C	249	646	4	0.88	0.51	0.058	8.8
23Ap	320	651	6	1.86	1.08	0.090	12.0
A-C	249	561	4	0.88	0.51	0.053	9.6
C	253	565	4	0.91	0.53	0.051	10.4
24Ap	521	999	10	2.26	1.31	0.204	6.4
A-C	402	867	4	1.95	1.13	0.121	9.3
C	251	615	4	0.91	0.53	0.072	7.4
25Ap	223	481	8	1.53	0.89	0.098	9.1
A-C	258	484	4	0.93	0.54	0.061	8.8
C	304	520	4	0.57	0.33	0.040	8.2
26Ap	212	484	8	1.67	0.97	0.112	8.7
A-C	240	421	4	1.12	0.65	0.075	8.7
C	319	509	4	0.50	0.29	0.037	7.8
27Ap	258	600	6	1.83	1.06	0.096	11.0
A-C	326	587	6	1.02	0.59	0.059	10.0
C	372	677	4	0.95	0.55	0.063	8.7
28Ap	282	663	6	1.81	1.05	0.093	11.3
A-C	310	526	4	0.60	0.35	0.032	10.9
C	271	528	2	0.72	0.42	0.044	9.5
29Ap	166	505	6	1.90	1.10	0.106	10.4
A-C	174	522	4	1.02	0.59	0.070	8.4
C	240	505	4	0.69	0.40	0.043	9.3
30Ap	281	528	8	1.45	0.84	0.136	6.2
A-C	272	538	4	0.83	0.48	0.065	7.4
C	294	490	4	0.46	0.27	0.040	6.7

Table 15.-Clay content, exchange properties, and pH value of the Mhqon group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./ 100g	m.e./ 100g	m.e./ 100g	%	
1Ap	34.1	29.02	1.94	27.08	93.31	6.4
A-C	46.4	36.58	0.09	36.49	99.75	7.5
C	47.9	37.69	0.40	37.29	98.94	7.6
2Ap	27.1	25.09	0.71	24.38	97.17	7.1
A-C	44.4	37.13	----	37.13	100+	7.7
C	50.5	39.20	----	39.20	100+	7.7
3Ap	24.6	22.30	2.95	19.35	86.77	5.9
A-C	24.7	22.60	0.80	21.80	96.46	6.5
C	16.8	20.12	0.15	19.97	99.25	7.2
4Ap	36.8	31.10	3.52	27.58	88.68	6.0
A-C	38.3	29.19	1.33	27.86	95.44	6.6
C	41.3	33.71	1.13	32.58	96.65	6.7
5Ap	32.8	29.93	0.86	27.35	91.38	6.0
A-C	34.3	29.25	0.83	26.83	91.73	6.2
C	52.7	41.08	1.18	40.51	91.61	6.8
6Ap	11.5	16.00	0.03	15.97	99.81	7.6
A-C	42.4	32.15	0.14	32.01	99.56	7.7
C	53.6	39.05	----	39.05	100+	7.6
7Ap	34.6	26.75	3.62	23.13	86.47	5.6
A-C	36.8	28.05	1.88	26.17	93.30	6.5
C	36.8	29.60	0.78	28.82	97.36	7.1
8Ap	19.4	20.70	0.23	20.47	98.89	6.9
A-C	14.2	17.44	----	17.44	100+	7.0
C	20.6	21.51	----	21.51	100+	7.0
9Ap	25.9	21.25	2.53	18.72	88.09	5.9
A-C	39.6	29.50	1.45	28.05	95.08	6.9
C	39.6	29.52	0.64	28.88	97.83	7.4
10Ap	14.1	19.75	1.78	17.97	90.99	6.9
A-C	41.0	34.24	2.31	31.93	93.25	6.7
C	34.1	31.57	1.42	30.15	95.50	7.0

(Continued)

Table 15.-(Continued) Clay content, exchange properties, and pH value of the Mhoon group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./ 100g	m.e./ 100g	m.e./ 100g	%	
11Ap	24.5	20.31	1.76	18.55	91.33	6.2
A-C	38.2	28.48	1.09	27.39	96.17	6.8
C	39.6	29.32	0.57	28.75	98.06	7.2
12Ap	23.3	20.53	3.34	17.19	83.73	5.8
A-C	27.4	24.06	0.69	23.37	97.13	7.0
C	48.0	37.17	0.35	36.82	99.06	7.3
13Ap	28.5	23.18	2.00	19.38	91.37	6.3
A-C	28.7	26.41	0.59	25.82	97.76	7.1
C	37.0	34.66	----	34.66	100+	7.7
14Ap	30.0	26.71	0.17	26.54	99.36	7.5
A-C	39.5	32.74	0.33	32.41	98.99	7.5
C	36.9	30.45	0.21	30.24	99.31	7.6
15Ap	20.5	21.21	1.47	19.74	93.07	6.5
A-C	25.9	23.03	0.65	22.38	91.18	7.2
C	32.5	23.19	0.56	22.63	97.58	7.1
16Ap	15.4	16.29	0.99	15.30	93.92	6.6
A-C	48.0	36.13	0.74	35.39	97.95	7.5
C	47.7	33.70	0.66	33.04	98.04	7.4
17Ap	56.6	37.05	1.91	35.14	94.87	6.3
A-C	66.7	41.56	1.19	40.37	97.14	6.4
C	49.4	31.12	0.66	30.46	97.88	6.5
18Ap	22.1	21.43	1.40	20.03	93.47	6.4
A-C	45.4	33.80	1.31	32.49	96.12	6.7
C	57.9	40.03	0.86	39.17	97.85	7.0
19Ap	23.2	20.68	2.40	18.28	88.39	5.9
A-C	28.8	25.61	0.91	24.70	96.45	6.9
C	33.0	28.23	1.27	26.96	95.50	7.2
20Ap	12.8	17.51	----	17.51	100+	7.3
A-C	23.4	22.65	----	22.65	100+	7.3
C	22.0	22.87	----	22.87	100+	7.4

(Continued)

Table 15.-(Continued) Clay content, exchange properties, and pH value of the Mhoon group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./ 100g	m.e./ 100g	m.e./ 100g	%	
21Ap	27.3	23.22	2.20	21.02	90.52	6.2
A-C	30.0	24.90	2.13	22.77	91.44	6.3
C	26.0	23.62	0.25	23.37	98.94	7.6
22Ap	30.0	26.14	4.40	22.10	84.54	5.8
A-C	34.1	27.43	2.04	25.39	92.56	6.5
C	43.8	32.71	1.70	31.01	94.80	6.8
23Ap	24.6	23.38	2.24	21.14	90.42	6.2
A-C	40.9	30.32	0.33	29.99	98.91	6.9
C	40.9	29.89	0.28	29.61	99.06	7.2
24Ap	35.2	28.13	1.62	26.51	94.24	6.1
A-C	39.3	30.14	1.76	28.38	94.16	6.4
C	48.1	34.77	0.23	34.54	99.34	6.8
25Ap	18.1	21.37	4.15	17.22	80.58	5.3
A-C	16.9	20.98	0.68	20.30	96.76	7.1
C	15.5	20.43	----	20.43	100+	7.6
26Ap	23.4	22.29	2.08	20.21	90.67	5.5
A-C	37.0	28.82	0.45	28.37	98.44	6.6
C	28.8	23.03	----	23.03	100+	6.8
27Ap	29.9	23.00	2.11	20.89	90.83	6.4
A-C	36.8	28.58	0.17	28.41	99.40	7.0
C	38.5	29.62	0.29	29.33	99.02	7.3
28Ap	19.3	19.80	1.03	18.77	94.80	6.8
A-C	23.3	21.88	----	21.88	100+	7.3
C	39.0	29.00	0.43	28.57	98.52	7.3
29Ap	35.2	25.70	3.66	22.04	85.76	5.6
A-C	46.6	32.86	1.56	31.30	95.25	6.3
C	32.6	19.82	1.11	18.71	94.40	6.4
30Ap	19.4	25.48	1.12	24.36	95.60	7.2
A-C	30.5	30.71	1.14	29.57	96.29	7.1
C	23.6	22.50	0.77	21.73	96.58	7.5

Table 16.-Physical properties of the Sharkey group soils.

Loc. No. and Horizon	Texture	Depth Inches	Structure	Consistency	Color
1Ap	c	0-9	Weak blocky	Plastic	V.dr.gr.
A-C	c	11-18	Blocky	Plastic	Dr.gr.mot.br.
C	c	20-26	Blocky	Plastic	Dr.gr.gr.
2Ap	sic	0-4	Weak blocky	Plastic	V.dr.gr.br.
A-C	c	6-20	Strong blocky	Plastic	Dr.gr.mot.w/br.
C	c	22-26	Strong blocky	Plastic	Dr.gr.mot.br.
3Ap	c	0-8	Weak blocky	Plastic	V.dr.gr.br.
A-C	c	10-18	Blocky	Plastic	V.dr.gr.mot.w/br.
C	c	20-26	Strong blocky	Plastic	Dr.gr.mot.br.
4Ap	c	0-7	Weak blocky	Plastic	Dr.gr.
A-C	c	9-18	Blocky	Plastic	Dr.gr.mot.gr.
C	c	20-26	Strong blocky	Plastic	Dr.gr.mot.gr.br.
5Ap	sic	0-9	Weak granular	Plastic	V.dr.gr.br.
A-C	sic	11-19	Blocky	Plastic	Dr.gr.mot.br.
C	sic	21-26	Blocky	Plastic	Dr.gr.mot.br.
6Ap	c	0-9	Weak blocky	Plastic	V.dr.gr.
A-C	c	11-18	Blocky	Plastic	Dr.gr.mot.gr.&br.
C	c	20-26	Blocky	Plastic	Gr.mot.dr.gr.&br.
7Ap	c	0-7	Weak blocky	Plastic	V.dr.gr.
A-C	c	9-16	Blocky	Plastic	Dr.gr.mot.v.dr.gr.
C	c	18-26	Strong blocky	Plastic	Dr.gr.mot.br.
8Ap	c	0-8	Blocky	Plastic	V.dr.gr.br.
A-C	c	10-18	Blocky	Plastic	V.dr.gr.mot.gr.br.
C	c	20-26	Blocky	Plastic	Dr.gr.mot.gr.&br.
9Ap	c	0-10	Weak blocky	Plastic	V.dr.gr.
A-C	c	12-19	Blocky	Plastic	Dr.gr.mot.gr.
C	c	21-26	Strong blocky	Plastic	Gr.dr.gr.mot.gr.
10Ap	c	0-9	Weak blocky	Plastic	V.dr.gr.
A-C	c	11-18	Blocky	Plastic	Dr.gr.
C	c	20-26	Blocky	Plastic	Dr.gr.mot.gr.
11Ap	c	0-7	Weak blocky	Plastic	V.dr.gr.
A-C	c	9-18	Moderate blocky	Plastic	V.dr.gr.mot.dr.gr.
C	c	20-26	Strong blocky	Plastic	Dr.gr.mot.gr.br.
12Ap	sicl	0-9	Weak blocky	Plastic	Dr.gr.br.
A-C	sic	11-18	Blocky	Plastic	Dr.gr.
C	sic	20-26	Blocky	Plastic	Gr.mot.dr.gr.&br.

(Continued)

Table 16.-(Continued) Physical properties of the Sharkey group soils.

Loc. No. and Horizon	Texture	Depth Inches	Structure	Consistency	Color
13Ap	c	0-8	Weak blocky	Plastic	V.dr.gr.&br.
A-C	c	10-18	Blocky	Plastic	V.dr.gr.mot.gr.
C	c	20-26	Blocky	Plastic	L.gr.mot.dr.gr.
14Ap	c	0-8	Weak blocky	Plastic	V.dr.gr.br.
A-C	c	10-16	Blocky	Plastic	Dr.gr.mot.br.
C	c	18-26	Blocky	Plastic	V.dr.gr.mot.br.
15Ap	c	0-8	Weak blocky	Plastic	V.dr.gr.&br.
A-C	c	10-18	Blocky	Plastic	Dr.gr.mot.br.
C	c	20-26	Blocky	Plastic	Dr.gr.mot.br.
16Ap	c	0-10	Fine blocky, Weak platy	Plastic	V.dr.gr.br.
A-C	c	12-18	Blocky	Plastic	Dr.gr.mot.br.
C	c	20-26	Blocky	Plastic	Dr.gr.mot.br.
17Ap	c	0-8	Weak blocky	Plastic	V.dr.gr.
A-C	c	10-18	Blocky	Plastic	Dr.gr.mot.br.
C	c	20-26	Blocky	Plastic	Gr.mot.dr.gr.&br.
18Ap	c	0-9	Weak blocky	Plastic	V.dr.gr.
A-C	c	11-19	Blocky	Plastic	Dr.gr.mot.br.
C	c	21-26	Blocky	Plastic	Dr.gr.mot.gr.&br.
19Ap	c	0-9	Weak blocky	Plastic	V.dr.gr.
A-C	c	11-19	Blocky	Plastic	Gr.mot.dr.gr.&br.
C	c	21-26	Blocky	Plastic	Gr.mot.dr.gr.
20Ap	sicl	0-7	Strong blocky	Plastic	V.dr.gr.
A-C	sicl	8-16	Blocky	Plastic	V.dr.gr.
C	sic	17-30	Blocky	Plastic	Gr.mot.v.dr.gr.br.
21Ap	c	0-12	Weak blocky	Plastic	Dr.gr.
A-C	c	14-20	Blocky	Plastic	Dr.gr.mot.gr.&br.
C	c	22-28	Blocky	Plastic	Dr.gr.mot.gr.&br.
22Ap	c	0-10	Blocky	Plastic	V.dr.gr.br.
A-C	c	12-19	Blocky	Plastic	Dr.gr.mot.br.
C	sic	21-26	Blocky	Plastic	Dr.gr.
23Ap	sic	0-9	Weak blocky	Plastic	V.dr.gr.&br.
A-C	sic	11-19	Blocky	Plastic	V.dr.gr.&br.
C	sic	21-26	Blocky	Plastic	Dr.gr.mot.br.&gr.
24Ap	sicl	0-8	Weak blocky	Plastic	V.dr.gr.br.
A-C	c	10-18	Blocky	Plastic	Dr.gr.mot.gr.&br.
C	c	20-26	Blocky	Plastic	Gr.mot.gr.&br, mot.red

1/ sicl = silty clay loam; sic = silty clay; c = clay.
2/ v = very; dr = dark; gr. = gray, grayish; br. = brown; mot. = mottled; w/br.= with brown; L. = light.

Table 17.-Potassium and sodium contents of the Sharkey group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
1Ap	367	528	1.57	82	54	0.99
A-C	277	488	1.55	102	68	0.97
C	241	437	1.96	124	71	1.11
2Ap	242	496	1.56	85	68	1.07
A-C	256	439	1.50	149	80	1.05
C	277	460	1.50	173	101	1.27
3Ap	212	370	1.52	161	98	1.19
A-C	218	389	1.50	109	90	1.20
C	232	433	1.67	124	99	1.19
4Ap	226	400	1.48	103	59	1.13
A-C	270	430	1.51	126	70	1.18
C	273	452	1.54	142	108	1.21
5Ap	339	485	1.63	103	48	1.18
A-C	210	368	1.57	149	70	1.34
C	229	399	1.60	195	132	1.26
6Ap	323	499	1.49	110	148	1.04
A-C	284	478	1.62	147	158	1.16
C	288	471	1.59	163	162	1.18
7Ap	248	392	1.71	124	60	1.07
A-C	236	374	1.63	137	79	1.14
C	220	364	1.70	146	89	1.15
8Ap	280	419	1.67	107	224	1.03
A-C	270	418	1.66	125	188	1.07
C	258	377	1.75	125	200	1.22
9Ap	229	338	1.47	103	110	1.07
A-C	258	405	1.46	136	130	0.93
C	192	312	1.40	137	138	1.13
10Ap	237	332	1.44	111	74	0.98
A-C	227	344	1.47	141	101	1.06
C	233	343	1.56	164	111	0.95
11Ap	261	362	1.45	80	39	1.04
A-C	253	328	1.47	124	51	1.06
C	254	355	1.48	129	78	1.09
12Ap	219	320	1.48	72	68	1.09
A-C	240	324	1.46	120	91	1.13
C	201	285	1.48	124	98	1.21

(Continued)

Table 17.-(Continued) Potassium and sodium contents of the Sharkey group soils.

Loc. No. and Horizon	Extract. K	Exch. K	Total K	Extract. Na	Exch. Na	Total Na
	ppm	ppm	%	ppm	ppm	%
13Ap	248	334	1.98	99	150	1.18
A-C	234	345	1.93	125	164	1.15
C	254	369	1.96	156	181	1.10
14Ap	230	235	1.89	124	58	1.00
A-C	208	324	1.95	195	69	1.07
C	239	327	1.94	244	107	1.07
15Ap	219	299	1.93	106	80	1.18
A-C	233	333	1.94	174	91	1.12
C	234	309	1.97	189	98	1.17
16Ap	301	396	1.86	103	54	1.04
A-C	261	372	1.95	171	70	1.14
C	256	355	1.94	174	93	1.08
17Ap	289	385	1.95	86	70	1.06
A-C	208	308	1.99	154	83	1.17
C	205	304	2.04	185	82	1.23
18Ap	206	292	1.88	146	48	1.11
A-C	186	304	1.91	225	88	1.15
C	221	322	1.98	281	118	1.18
19Ap	215	299	1.89	109	61	1.11
A-C	225	315	1.97	157	98	1.15
C	275	385	1.99	205	117	1.25
20Ap	186	216	1.91	66	48	1.36
A-C	158	173	1.92	72	78	1.36
C	206	223	1.93	134	105	1.17
21Ap	255	336	1.97	94	148	1.25
A-C	256	333	1.99	137	167	1.25
C	248	321	1.97	128	171	1.32
22Ap	222	273	2.04	98	39	1.34
A-C	226	308	1.96	143	70	1.32
C	215	285	2.01	137	74	1.34
23Ap	186	261	1.96	102	59	1.15
A-C	214	288	1.98	127	64	1.25
C	223	311	2.05	132	84	1.32
24Ap	172	241	1.92	94	62	1.47
A-C	215	355	1.92	186	82	1.29
C	230	382	2.05	200	94	1.36

Table 18.-Calcium and magnesium contents of the Sharkey group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
1Ap	5244	6451	0.73	903	934	0.70
A-C	5590	6990	0.73	1065	1145	0.80
C	5294	6668	1.84	1108	1063	0.86
2Ap	4107	5390	0.61	909	896	0.70
A-C	5298	7078	0.67	1094	1274	0.86
C	5679	6626	1.17	1290	1280	1.00
3Ap	3768	5085	1.05	797	966	0.77
A-C	3749	5010	0.99	970	1072	0.77
C	4223	5650	0.97	1229	1347	1.02
4Ap	4687	5846	0.80	984	1097	0.88
A-C	4907	6160	1.12	1236	1246	1.04
C	4882	6193	1.05	1169	1188	1.01
5Ap	4062	5737	0.80	975	992	0.88
A-C	3990	6140	1.11	1083	1118	0.91
C	4169	6413	1.11	1185	1251	0.98
6Ap	5425	7508	1.10	1061	1189	0.99
A-C	6342	8071	1.43	1347	1219	1.10
C	6525	8116	1.24	1504	1147	1.10
7Ap	5655	6863	0.93	1217	1407	1.03
A-C	5109	6587	0.93	1227	1435	1.01
C	5436	6533	0.99	1402	1514	1.07
8Ap	5088	6488	1.05	1103	1247	0.97
A-C	5144	6634	1.11	1095	1263	1.00
C	4882	6543	1.11	1059	1138	0.98
9Ap	3957	4881	0.74	1016	1201	0.83
A-C	4418	5642	0.80	1267	1538	1.00
C	3635	4851	0.80	1039	1214	0.78
10Ap	5339	6552	1.05	1117	1266	0.90
A-C	5352	6078	1.10	1138	1326	0.91
C	5409	6560	0.75	1217	1361	0.98
11Ap	4775	5588	0.61	1109	1221	0.88
A-C	5803	6492	0.81	1379	1301	1.04
C	6653	6792	1.05	1269	1359	1.00
12Ap	4569	1301	0.74	803	988	0.71
A-C	4964	5475	0.68	980	1050	0.88
C	4037	5056	0.81	933	845	0.87

(Continued)

Table 18.-(Continued) Calcium and magnesium contents of the Sharkey group soils.

Loc. No. and Horizon	Extract. Ca	Exch. Ca	Total Ca	Extract. Mg	Exch. Mg	Total Mg
	ppm	ppm	%	ppm	ppm	%
13Ap	6495	7397	1.36	1307	1295	0.85
A-C	5348	6634	1.11	1326	1528	0.79
C	5005	6298	1.17	1385	1628	0.88
14Ap	5504	6677	1.04	1239	1394	0.81
A-C	5656	6724	1.29	1339	1445	0.89
C	6570	9401	1.84	1899	1479	0.94
15Ap	4508	5508	0.79	1154	1292	0.77
A-C	4939	5804	1.41	1291	1427	0.87
C	4764	5469	1.35	1241	1341	0.83
16Ap	4954	4950	1.17	1190	1395	0.78
A-C	5425	5950	1.49	1428	1548	0.96
C	6340	6038	1.60	1615	1513	0.92
17Ap	3968	4771	0.98	1078	1247	0.75
A-C	4246	5385	1.11	1221	1381	0.82
C	4299	5452	1.37	1236	1409	0.80
18Ap	4985	5948	1.17	1313	1598	0.83
A-C	5015	5834	1.17	1389	1610	0.88
C	4850	5924	1.18	1376	1551	0.93
19Ap	5761	6392	1.17	1068	1191	0.77
A-C	6480	6655	1.45	1549	1353	0.88
C	6565	7400	1.84	1514	1724	0.90
20Ap	3973	4492	1.17	924	943	0.61
A-C	4566	4791	1.36	1020	960	0.62
C	3823	5127	1.60	1770	1080	0.90
21Ap	4953	6035	1.13	1307	1499	0.80
A-C	4794	6098	1.20	1362	1534	0.85
C	4503	5644	1.13	1291	1455	0.86
22Ap	4943	5712	1.38	1114	1153	0.73
A-C	4676	5938	1.13	1282	1384	0.83
C	4199	5140	1.12	1245	1231	0.82
23Ap	6180	5151	0.88	1079	1165	0.70
A-C	4745	5457	1.06	1315	1262	0.79
C	5236	5681	1.18	1593	1328	0.81
24Ap	4690	6238	1.24	1119	1045	0.68
A-C	5645	7178	1.27	1598	1663	0.87
C	5730	6530	1.34	1651	1717	0.95

Table 19.-Phosphorus, sulphur, carbon and nitrogen contents of the Sharkey group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic Matter	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	%	
1Ap	992	1287	10	2.98	1.73	0.128	13.5
A-C	502	740	6	1.93	1.12	0.100	11.2
C	313	668	6	1.18	0.68	0.083	8.2
2Ap	180	494	8	3.86	2.24	0.160	14.0
A-C	112	384	8	1.66	0.74	0.153	11.4
C	246	450	6	0.76	0.44	0.158	9.1
3Ap	124	483	20	2.76	1.60	0.131	12.2
A-C	128	468	16	2.45	1.42	0.127	11.2
C	125	398	12	1.07	0.62	0.079	7.8
4Ap	168	639	8	3.59	2.08	0.152	13.7
A-C	184	488	6	1.38	0.80	0.090	8.9
C	215	572	6	1.31	0.76	0.080	9.5
5Ap	257	969	12	3.78	2.19	0.151	14.5
A-C	219	524	10	1.50	0.87	0.080	10.9
C	240	519	6	1.38	0.80	0.080	10.0
6Ap	150	549	10	3.34	1.94	0.163	11.9
A-C	217	492	8	1.50	0.87	0.090	9.7
C	269	506	8	1.57	0.91	0.098	9.3
7Ap	193	551	8	4.02	2.33	0.170	13.7
A-C	121	373	14	2.31	1.34	0.119	11.3
C	241	448	12	1.34	0.78	0.089	8.8
8Ap	154	581	8	2.65	1.54	0.127	12.1
A-C	171	518	4	2.62	1.52	0.126	12.1
C	234	541	4	1.57	0.91	0.093	9.8
9Ap	124	720	14	2.99	1.74	0.142	12.3
A-C	95	606	10	1.41	0.82	0.093	8.8
C	111	588	10	1.17	0.68	0.076	8.9
10Ap	173	783	24	3.86	2.24	0.193	11.6
A-C	122	714	18	2.93	1.70	0.149	11.4
C	106	686	8	2.50	1.45	0.153	9.5
11Ap	200	709	14	3.45	2.00	0.140	14.3
A-C	227	571	10	1.57	0.91	0.095	9.6
C	168	497	8	1.41	0.82	0.072	11.4
12Ap	266	692	16	2.69	1.56	0.112	13.9
A-C	252	691	8	1.74	1.01	0.097	10.4
C	282	704	12	1.24	0.72	0.080	9.0

(Continued)

Table 19.-(Continued) Phosphorus, sulphur, carbon and nitrogen contents of the Sharkey group soils.

Loc. No. and Horizon	Extract. P	Total P	Extract. S	Organic Matter	Organic C	Total N	C/N Ratio
	ppm	ppm	ppm	%	%	%	
13Ap	235	822	12	2.71	1.57	0.127	12.4
A-C	203	630	10	3.14	1.82	0.155	11.7
C	200	621	8	1.76	1.02	0.100	10.2
14Ap	181	929	8	3.43	1.99	0.139	14.3
A-C	197	786	4	1.69	0.98	0.094	10.4
C	204	751	6	1.36	0.79	0.069	11.4
15Ap	230	949	8	3.29	1.91	0.139	13.7
A-C	226	594	8	1.69	0.98	0.080	12.3
C	231	617	4	1.76	1.02	0.072	14.2
16Ap	291	1120	6	3.60	2.09	0.140	14.9
A-C	222	675	4	1.43	0.83	0.087	9.5
C	198	635	6	1.34	0.78	0.078	10.0
17Ap	189	976	10	3.69	2.14	0.171	12.5
A-C	166	631	12	2.90	1.68	0.126	13.3
C	178	526	4	2.07	1.20	0.105	11.4
18Ap	159	791	8	4.19	2.43	0.184	13.2
A-C	177	742	6	1.88	1.09	0.097	11.2
C	255	675	6	1.34	0.78	0.075	10.4
19Ap	186	702	10	3.41	1.98	0.152	13.0
A-C	213	715	6	1.88	1.09	0.067	16.3
C	180	497	8	1.76	1.02	0.075	13.6
20Ap	547	953	28	4.70	2.73	0.155	17.6
A-C	600	939	18	4.07	2.36	0.145	16.3
C	208	956	12	2.09	1.21	0.080	15.1
21Ap	176	659	10	3.60	2.09	0.179	11.7
A-C	174	583	4	2.07	1.20	0.100	12.0
C	177	679	4	1.81	1.05	0.094	11.2
22Ap	707	1529	12	3.41	1.98	0.140	14.1
A-C	229	670	8	1.95	1.13	0.094	12.0
C	263	678	6	1.60	0.93	0.084	11.1
23Ap	203	700	14	3.10	1.80	0.158	11.4
A-C	235	444	8	1.76	1.02	0.096	10.6
C	281	405	6	1.51	0.88	0.082	10.7
24Ap	243	770	8	4.20	2.44	0.165	14.8
A-C	215	590	8	1.76	1.02	0.080	12.8
C	267	604	4	1.62	1.94	0.081	11.6

Table 20.-Clay content, exchange properties, and pH value of the Sharkey group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./100g	m.e./100g	m.e./100g	%	
1Ap	54.74	42.38	2.18	40.20	94.86	7.2
A-C	63.52	45.97	1.32	44.65	97.13	7.5
C	61.79	42.89	0.55	42.34	98.72	7.6
2Ap	56.50	37.46	2.88	34.58	92.31	6.5
A-C	61.93	46.90	0.75	46.15	98.40	7.4
C	64.30	44.44	0.48	43.96	98.92	7.5
3Ap	47.49	35.32	1.71	33.61	95.16	6.3
A-C	48.92	36.93	2.81	34.12	92.39	6.3
C	60.91	42.21	2.58	39.63	93.89	6.8
4Ap	59.16	42.72	4.22	38.50	90.12	6.0
A-C	62.11	43.55	2.23	41.32	94.88	6.8
C	61.54	42.73	1.69	41.04	96.04	7.0
5Ap	51.55	41.33	4.23	37.10	89.77	6.4
A-C	49.02	41.79	1.65	40.14	96.05	7.2
C	52.46	43.94	1.28	42.66	97.10	7.4
6Ap	66.40	50.86	3.22	47.64	93.67	6.4
A-C	67.36	50.71	0.00	50.71	100.00	7.5
C	62.05	50.33	0.00	50.33	100.00	7.5
7Ap	63.75	49.23	3.05	46.18	93.80	7.0
A-C	65.93	45.96	0.93	45.03	97.98	7.4
C	61.54	45.42	0.00	45.42	100.00	7.7
8Ap	65.65	45.92	2.88	43.04	93.73	6.5
A-C	66.60	45.99	2.10	43.89	95.43	7.0
C	57.93	43.32	0.93	42.39	97.85	7.3
9Ap	55.53	38.64	4.08	34.56	89.44	6.0
A-C	69.52	43.51	2.32	41.19	94.67	6.5
C	51.34	36.47	1.95	34.52	94.65	6.5
10Ap	56.41	45.28	1.85	43.43	95.91	6.8
A-C	63.84	43.25	1.68	41.57	96.12	6.8
C	69.65	45.63	1.35	44.28	97.04	7.0
11Ap	60.07	41.91	3.68	38.23	91.22	6.2
A-C	67.36	43.61	0.21	43.40	99.52	7.3
C	68.65	45.41	0.00	45.41	100.00	7.6
12Ap	41.07	36.55	1.70	34.85	95.35	6.8
A-C	52.57	37.84	1.59	36.25	95.80	6.8
C	49.95	33.86	1.43	32.43	95.78	7.0

(Continued)

Table 20.-(Continued) Clay content, exchange properties, and pH value of the Sharkey group soils.

Loc. No. and Horizon	Clay	Cation Exchange Capacity	Exch. H	Total Exch. Bases	Base Sat.	pH
	%	m.e./100g	m.e./100g	m.e./100g	%	
13Ap	73.45	49.32	1.38	47.94	97.20	7.0
A-C	70.44	46.26	0.20	46.06	99.57	7.3
C	67.53	45.23	0.00	45.23	100.00	7.6
14Ap	63.58	47.08	1.98	45.10	95.79	6.8
A-C	66.60	45.77	0.00	45.77	100.00	7.6
C	68.44	59.47	0.00	59.47	100.00	7.7
15Ap	57.11	41.78	3.35	38.43	91.98	6.4
A-C	68.88	41.65	0.61	41.04	98.54	7.3
C	66.60	38.85	0.20	38.65	99.49	7.6
16Ap	67.81	40.18	3.68	36.50	90.84	6.4
A-C	76.35	44.54	1.76	42.78	96.05	7.4
C	72.85	42.93	0.00	42.93	100.00	7.6
17Ap	59.77	38.91	4.53	34.38	88.36	5.9
A-C	65.39	40.66	2.10	38.56	94.84	6.8
C	67.50	40.21	1.09	39.12	97.29	7.3
18Ap	65.65	47.53	4.38	43.15	90.78	6.0
A-C	69.23	43.99	1.28	42.71	97.09	7.1
C	67.08	43.61	0.93	42.68	97.87	7.2
19Ap	64.30	43.95	1.95	42.00	95.56	6.8
A-C	69.52	44.68	0.00	44.68	100.00	7.5
C	78.75	51.52	0.00	51.52	100.00	7.6
20Ap	33.37	32.25	1.85	30.40	94.26	6.8
A-C	34.87	33.43	1.40	32.03	95.81	7.1
C	53.96	34.75	0.00	34.75	100.00	7.6
21Ap	65.31	46.16	3.34	42.82	92.76	6.3
A-C	67.32	44.95	1.52	43.43	96.62	7.1
C	62.83	42.01	1.51	40.50	96.41	6.8
22Ap	53.44	41.70	3.44	38.26	91.75	7.0
A-C	65.24	42.70	1.37	41.33	96.79	7.1
C	56.88	37.30	1.24	36.06	96.68	7.0
23Ap	53.50	39.55	3.98	35.57	89.94	6.3
A-C	58.66	38.72	0.81	37.91	97.91	7.2
C	58.90	39.81	0.21	39.60	99.47	7.4
24Ap	41.32	41.13	1.14	39.99	97.23	7.3
A-C	78.04	50.41	0.53	49.88	98.95	7.5
C	79.87	47.10	0.00	47.10	100.00	7.5

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